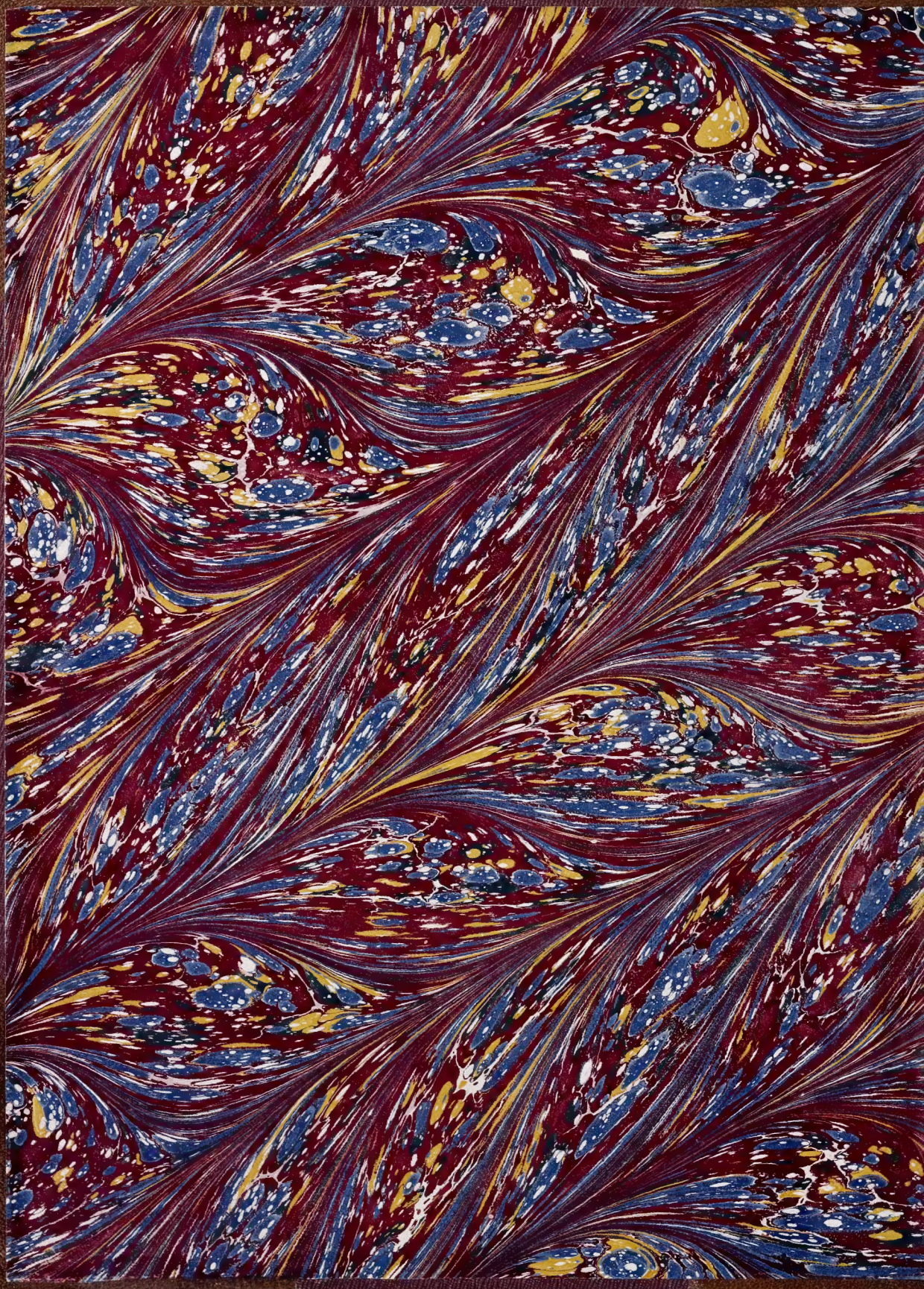




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O (François d'), governor of Paris and of Normandy, designed the château de Fresnes, near Meaux, occupied by Mons. Hennequin, conseiller au Parlement. A great part of the château was designed by F. Mansard (died 1666) especially the chapel, for the secretary of state Guénégaud; and later occupied by the chancellor d'Aguesseau.

O (Juan de Nuestra Senora de la), was born 1565, at La Mata, a village in the district of Maqueda, in the archbishopric of Toledo, and was educated in Madrid, where he studied architecture. After some years he decided upon going to the Indies, but arriving at Seville, and his wife and three sons having died there, he returned to Madrid with his only son Lorenzo, then six years old: from whence he departed for La Mata, where he left him with his relatives to be educated. Thence he went to Montalvan, where he spent four years as an artisan; then returned to La Mata, and with his son went to Madrid, where he took, 17th Dec. 1606, the lay habit of the descalzes Augustinas, and was immediately transferred to Jarandilla, to pass his noviciate and to direct and construct the college there, where he remained for five years; later, about 1610, constructed that of the church of La Nava el Rey; and of the Recoletos at Madrid, finished 1620. In 1633 he resided at the monastery of the desert of La Viciosa in the county of Oropesa, which he also built with its church, after its destruction by fire 1606. He died 1647, at Toledo, aged 80 years. 66.

Lorenzo de S. Nicolas was born about 1595; when about ten or eleven years old, desiring to join the order to which his father belonged, he was sent to study at Jarandilla, but changing his mind, he returned to Madrid, and was placed with an architect to study. In 1610 he went with his father to Nava el Rey, and in two years returning to Madrid, he took the habit 25th Dec. 1612, being then about seventeen years of age. Having leisure, he studied arithmetic and geometry, and continued architecture under his father. After twenty years of lay servitude, he was raised to the priesthood, and alone directed many works though not of considerable magnitude, including sixteen churches and chapels. In Madrid, the little Doric chapel of the Desamparo de Cristo, in the church of the Recoletos; the church of the nuns of S. Placido; the cupola of the parish church of S. Martin; and the chapel of Santissimo Cristo. In Salamanca he designed the church of the monastery of his order, which was executed by his pupil, Pedro de S. Nicolas. In Talavera, he constructed the great chapel of the church of N. S. del Prado, including the fourth timber dome to be found in Spain, in imitation of that at the imperial college at Madrid. Lorenzo had previously executed the second in the above named chapel of the Recoletos, and drawn the third for the church of his monastery at Salamanca. In Toledo the cupola of the church of the Vidapobre; in Villaseca, another cupola; and in Colmenar de Oreja, the church of the nunnery of descalzes Augustinas, are others of his works. Finding the want of publications upon architecture in the Spanish language, and the great difficulty and cost of obtaining them in other languages, he wrote and published *Arte y uso de la Arquitectura*, fol., Madrid, 1633. Pedro de la Peña, an architect, offered various objections to it, the principal one being "why should a priest meddle with the art?" and tried to stop the sale of the book, which was not interfered with by the authorities, who allowed Lorenzo to publish his answer in the second part in 1664; being a supplement and correction of the first part, in which latter he had given some façades of churches executed by him, but without naming them. In 1664 he was seventy years of age, and is supposed to have died in a few years at Madrid. He was the last architect of the century who retained the solidity and good taste which distinguished the close of that preceding it. 66.

OAK. The timber obtained from the several varieties of the QUERCUS in this and other countries, and cut into boards and stuff for building purposes. Planks of it for furniture and decorative work are usually called WAINSCOT (CLAP-BOARD; ESTRICH BOARDE). The Oldfieldia or Swietania Senegalensis or S. Khaya, gives the African oak or African teak or mahogany timber. The Casuarina affords the Botany Bay oak, beef wood, or she oak. "The characteristic properties of the *British* oak are, upon the whole, so good that it has long been accepted by practical men as a standard of quality and fitness for building purposes, and in the classification of all other hard and heavy woods in use in the royal dockyards, they are tabulated as 'substitutes' for oak. If grown in sheltered situations or in forests, it frequently reaches to a height of 70 to 100 ft., with a clear straight stem of from 30 to 40 ft., and a circumference of 8 to 10 ft., and larger specimens were formerly common." Perhaps the largest logs of British oak recorded are the eight obtained 1332, "after many tedious personal journeys" by Alan de Walsingham for the angles of the lantern of Ely cathedral. They are each 50 ft. long, and give a sapless scantling of 2 ft. 9 in. by 1 ft. 9 in.; Rowe, *Sessional Papers*, Royal Inst. of Brit. Archts., 1875-76, p. 72. "In open and exposed situations it is shorter, and frequently takes eccentric forms; this is one of its most valuable characteristics for shipbuilding. The wood is light, brown in colour, hard, tough, and very strong; it does not splinter readily, and resists well the action of water. In seasoning it is apt to warp and shrink, although not to any considerable extent, and it should not therefore be used until thoroughly dry; but when so, few woods are liable to so little

change, particularly when employed in situations where it is protected from the influence of moisture or draught. When subjected to alternations of wet and dry, it withstands the change better than most other woods; while if kept wholly submerged there is scarcely any limit to its endurance. Oak timber has, however, one drawback: it contains a powerful pyroligneous acid, which prevents its general employment in immediate contact with iron, as the metal is subjected to a corrosive action, while the timber is also liable to suffer by waste and deterioration."

"The oak timber of the north-western provinces of *France*, and especially of Brittany and Normandy, closely resembles British oak timber in colour, quality, texture, and general characteristics. Until about 1860 it was thought to be generally inferior in quality to the British oak, from the fact of the best timber having been first selected by the French Government. It is generally smaller, shorter, and has a more tapering form than the English oak timber tree. The timber of the oak trees of *Italy* is also inferior in size; the colour is brown; it is hard, heavy, tough, strong, less elastic, and slightly heavier than English oak, and on account of its extreme hardness it is more difficult to work. In seasoning it is very apt to split and leave deep shakes on the exterior of the log; owing to this defect it is unfit for conversion into planks, or boards, or into almost any small scantlings. The Tuscan, Neapolitan, and Sicilian varieties are the hardest and most horny, and when thoroughly seasoned, by far the most difficult to work; while the Modena, Roman, and Sardinian are what the workmen call 'milder' in character."

"The *Dantzic* oak tree, the produce of the Polish forests, and from Memel and Stettin ports, varies from 18 to 30 ft. in length, from 10 to 16 in. square, with also planks 24 ft. and upwards in length, averaging about 32 ft.; the breadth being from 9 to 15 in., and the thickness varying from 2 to 8 in. Large quantities of staves for casks or barrels roughly cleft from the tree are also sent. The wood is brown in colour, of moderate strength and hardness, rather porous, and having the medullary rays bright and sufficiently distinct to qualify it in some instances for wainscot purposes. It stands well the wear and tear of gun carriages when used for decks. For planking it is much esteemed, as the grain is straight, clean, and almost free from knots. It is also so pliable and elastic, when boiled or heated by steam, that it may be bent into almost any curved form. The timber is carefully classified into "crown and crown brack", the former being the best. The planks of each thickness are sorted into first and second qualities in the timber, and marked "W and WW" on the side. In building it may be used with advantage for a great variety of purposes, as it stands well, shrinks only moderately, and without splitting much in seasoning. The *Riga* oak comes from the interior of Russia. Its dimensions are only moderate; it is far from abundant, and therefore usually reaches this country in the form of wainscot logs for ornamental work and for furniture. The medullary rays are very numerous and more distinctly marked than is the case with the Dantzic oak, otherwise it is very much the same."

The *American* white oak tree, is so called from the pale ash colour of its bark; the logs are invariably straight, generally varying from 25 to 40 ft. in length, and from 12 to 28 in. thick. The wood is of a pale reddish brown colour, straight grained, moderately hard and compact, tough, strong, and of fair durability. Planks when steamed may be bent into almost any curve. The wood opens very sound; it shrinks but little and almost without splitting during the process of seasoning; and is by far the best foreign oak timber of straight growth and large dimensions for constructive purposes that has ever been imported. In experiments it compared very favourably with all the foreign oaks, but proved to be slightly inferior in strength to the English oak. The American Live oak tree is perhaps stronger than any other known oak. The Baltimore oak is, when thoroughly dry, scarcely so strong as the best fir or pine, and soon decays if not protected by paint after seasoning. The *Canadian* oak is brown in colour, has a fine, straight, clean, grain, is somewhat porous, shrinks moderately without splitting, is easy to work, and stands well after seasoning. It is used by cabinet makers and others for furniture; it is quite unfit for architectural works requiring strength or durability. Some other oaks are used in America in architectural works". The above extracts are from Laslett, *Timber and Timber Trees*, 8vo., London, 1875, the latest publication on the subject. Tredgold, *Carpentry*, 4to., 1828.

The specific gravity of the quercus robur may be taken at about ·800, and the weight of a cube foot 50·45 lbs.: that of quercus sessiliflora at ·875 and about 55 lbs. respectively. Their cohesive force and toughness are proportionate; Gwilt, *Encyc.*, §1687. Of English oak 36·205 cubic feet weigh one ton, and of Dantzic oak 47·158 ft.: Gregory, *Mechanics*.

Rondelet,	5000 lbs. to 6000 lbs. to crush oak 1 in. square.		
Rennie,	3860 lbs.	„	1 „ „ and 1 in. high.
Laslett,	7978 lbs. or 3·562 tons	„	1 in. cube of seasoned oak,

who states from his own experiments (which should be consulted) that "the proper proportion of sectional area to length for this description of (English) timber is as about 4:5; or the superficial area of the base in inches should not be less than four-fifths the length of the pillar or column in inches". Gwilt, *Encyc.*, B. ii, ch. i, § x, is to be consulted.

The method formerly adopted of cutting a large log for various purposes, is explained in Gwilt, *Encyc.*, § 2125*a*, from Viollet-le-duc, *Dict.*; and the cause of twisting and shrinking according to the cutting is figured in the article Building, in *Encyc. Britt.*, 9th edit., p. 486.

OAK LEAF. The leaf of the oak has been largely introduced in mediæval sculpture, in capitals as at York minster; and in crockets and finials, in Aveline's tomb in Westminster abbey.

OAKLEY (Edward), architect, designed 1732, the hot and green houses in the Botanic garden at Chelsea; and made 1756 a design for Blackfriars bridge, engraved in Maitland, *London*, edit. by Entick, 1756, p. 1390*. He published *The Magazine of Architecture, Perspective and Sculpture*, etc., fol., Westm., 1730; and *Every Man a Compleat Builder; or, Easy Rules*, etc. 1738(?); 1766; 1774.

OARE (João), commenced 1387 the church of N. S. da Oliveira, at Guimaraens, in Portugal, having a detached tower with a low spire. 1.

OASIS (Arabic *Wady*). The name given to those fertile spots, which are scattered about the great sandy deserts of Africa, and presenting many remains of antiquity. Cailliaud, *Voyage à l'Oasis de Thèbes*, 1813; and *Voyage à Méroé—à Syouah et dans cinq autres Oasis*, fol., Paris, 1823-7. Hornemann, *Travels in Fezzan*, 4to., Lond., 1802. Browne, *Travels in Africa*, etc., 1799; 2nd edit., 4to., Lond., 1806; and Hoskins, *Visit to the Great Oasis of the Libyan Desert*, etc., 8vo., Lond, 1837. Menu von Minutoli, *Reise zum tempel des Jupiter Ammon*, 4to. and fol., Berlin, 1824. Langles, *Mémoires sur les Oasis*. Heb, now El Khargeh. 23. 28.

OAST HOUSE or Hop oast. The building in which hops are dried by means of a kiln, the object being to drive off the superfluous moisture from the hops. The liberal introduction of air into the kiln is considered the basis of a successful system of hop-drying. Hops after being gathered from the bine or stalk, are immediately carried in bags to the kiln, on a floor over which they are spread out to the thickness of from 6 to 10 in. The fire is then lighted and kept burning until all the hops are dried. After being dried, the hops are swept off into a cool well ventilated loft adjoining, where they are left for a day or more, and then bagged or pocketed; the bag usually weighing 2½ cwt., and the pocket 1½ cwt.; when well packed, the mouth is sewn up and then carried to the store loft or to market. The situation of an oast house ought to be

airy, and the external opening to it, for the admission of air, should face that point of the compass from which the wind blows most frequently at that season of the year when the hops are being dried; thus, in England in September, when the wind is usually south-west. The kiln is built either square or circular; the floor of it being formed of haircloth, of tiles, or of wire cloth, laid on iron joisting. A tile one foot square contains 120 large apertures on the underside, with 8 small ones to each on the upper surface. The wire cloth is made of various degrees of fineness; MALT HOUSE.

LOUDON, *Encyc. of Cottage, etc., Arch.*, 8vo., Lond., 1842, p. 592, gives the details of a long building with six kilns having two floors over them; and the circular kilns with hot flues, by John Read at Teston, in Kent; the former he considers as discreditable as the latter is scientific, and upon which plan some hundreds had been built. An oast house at Bekesbourne in Kent, erected for the marquis of Conyngham, 70 ft. long, with three kilns, is described in BUILDING NEWS *Journal*, xvii, 1869, p. 198. ROSSER, *Observations on Hop Drying*, 8vo., Lond., 1856; reviewed in CIVIL ENGINEER, etc., *Journal*, xix, 221, with a woodcut of a kiln.

OAXACA and Oajaca, properly Guaxaca, from the trees called *guaxes* growing around it, or Sta. Maria de la valle de Guaxaca, and also called Antequera de Oaxaca. The capital of the state of the same name in Mexico. It is about 2 miles in length by $1\frac{1}{4}$ in breadth, including the suburbs. The episcopal see was formed in 1535 or 1547. The cathedral dedicated to the Assumption of the Virgin is said to be very magnificent. There are a number of rich churches and monasteries, a town house, a bishop's palace, a hospital, and an aqueduct. The ruins of the ancient palace at MITLA, and other antiquities, are situated in this state. 14. 50. 96.

OBEDIENTIA. The Benedictine order of Cluny possessed secondary establishments which were similar to the granges of the Cistercians and called Obedientia. They contained all the requisites of a monastery. To these places the monks of the abbey were banished as a punishment. Most of these establishments have become farms, the property of the laity. Between Avallon and Savigny is a chapel of the end of the twelfth century, with the ruins of a cloister and other portions, which still retain the name of the priory of S. Jean les bons-hommes. VIOLLET-LE-DUC, *Dict.*, i, 277, gives a plan and description of it. CELL.

OBELISK. (It. *aguglia;* Span. *obelisco;* Fr. *obélisque;* Ger. *spitzsaule.*) A term derived from the Lat. *obeliscus*, a diminutive of the Greek ὀβελός, a skewer, spit, or needle; and hence called familiarly a *needle;* and said by PLINY to represent a solar ray. An obelisk is most usually a lofty four-sided monolithic shaft, diminishing upwards, with the sides (which are somewhat convex) gently inclined, and polished, and covered more or less with hieroglyphics, generally incised after the block had left the quarry. The apex or pyramidion, one-tenth of the elevation in height, was obtained by the sides being sloped off so as to form a flattish pyramidal figure (that at Arsinöe, now Biggig or Medeenet el Fayoum, 12th dynasty of LEPSIUS, is rounded; and see AXUM). The general law of proportion is that the base is one-tenth of the elevation up to the point. The shaft is placed upon a pedestal or base, of which those at Karnak, Luxor, etc., vary in height and proportions according to the proposed purposes. Some are placed on the rock or other foundation; some raised a step, or on a plinth of a few inches; others upon a pedestal with steps. Few ancient obelisks are perfectly square, two sides are generally broader than the other two. Between Nicæa and Constantinople there is a triangular obelisk standing in the middle of the plain; it bears an inscription, which has been published by POCOCKE, proving it to have been erected in honour of C. Cassius Philiscus. In Egypt, the obelisk is a purely historical monolith, generally made of the red granite of Syene, and placed originally in pairs in front, and one on each side, of the propylon to a large royal or religious building, recording in the inscription the names, titles, and dedicatory offerings of the monarch, whose munificence and piety had built, repaired, or otherwise embellished the edifices. It appears that obelisks received a kind of worship similar to that offered to idols and gods (BIRCH, p. 309). The Romans sometimes placed an obelisk in the middle of the *spina* of a circus.

In Egypt, obelisks are found from Philæ on the Nile, to the Mediterranean; none are seen in Lower Nubia. At the pyramids of Geezeh, LEPSIUS, *Discoveries*, 8vo., Lond., 1853, p. 43, describes finding "standing in its original place in a grave of the beginning of the 7th dynasty, an obelisk of but a few feet in height (7 feet), but well preserved, and bearing the name of the person to whom the tomb was erected. This form of monument, which plays so conspicuous a part in the New Empire, is thus thrown some dynasties further back into the Old Empire than even the obelisk of Heliopolis"; an example which hitherto was considered to be the most ancient, dated in the reign of Osertesen I, of the 16th dynasty (about 2800, 2300, or 2070 B.C.) It is about 61 ft. high, and 6 ft. 6 in. at the base, on a block or pedestal, and was conveyed some 640 miles from the quarries at Syene to its present site. Two obelisks were removed from Heliopolis (Matarieh) to Alexandria; and two to Rome by Augustus. One at Philæ was removed by Belzoni and is now at Kingston Hall, Dorsetshire, the seat of W. J. Bankes, esq.; it is of red granite, 22 ft. 1 in. long, 2 ft. 2 in. square at the base, and 1 ft. $5\frac{3}{4}$ in. at top. (*Egyptian Antiquities*, ii, 376; BUILDER *Journal*, xvii, 606). There is one at Thebes (Karnak). The Luxor obelisk, about 76 ft. high and 8 ft. wide on its broadest side, was conveyed to and erected at Paris, by M. A. LEBAS, 1831-6, who published an account of the operations: ALLGEMEINE BAUZEITUNG, pl. 632: GODWIN, *On the Obelisk from Luxor*, read at Inst. of Brit. Architects, 1836, and printed in LOUDON, *Arch. Mag.*, 8vo., Lond., 1837, p. 464, with cuts: the raising of it cost 560,000 frs. Its apex is also described and commented upon by HITTORFF, in paper read 27th February 1837, and printed in same vol. p. 560; and in 1871, it was said to be weathering away (BUILDING NEWS *Journal*, 523). In the Egyptian museum at Naples is a fragment of one from Palestrina. In the British museum, London, are fragments of two, of black basalt. In the quarries at Syene is still a half formed obelisk between 70 and 80 feet long, together with unfinished columns, sarcophagi, etc.; HAMILTON, *Ægyptiaca*, p. 69. Of the twelve obelisks at Rome, three were raised 1586-89, by G. Fontana; two 1651, 1667, by G. Bernini; and three 1786-1792, by G. Antinori. They are engraved and described in UNGARELLI. MONOLITH.

Assur-bani-pal, 7th cent. B.C., in his expedition to recover Egypt from Urdamane, nephew of Tirhakah, removed two obelisks from Thebes as trophies to Nineveh: the weights are given in the Tablets, as stated by G. SMITH, *Trans.* of Society of Biblical Archæology, 1874, iii, 458. At Kouyunjik, in Nineveh, one was found 1853 of white stone, 9 ft. 2 in. high, and 6 ft. 3 ins. square at the base. Another, of Divanubara, found at Nimrud, now in the British Museum, is flat at the top and cut into three gradines; it is described in LAYARD, *Nineveh*, 8vo., 1849, i, 347: FERGUSSON, *History*, 8vo., Lond., 1865, i, 170. At Axum, in Abyssinia, one, the last of fifty-five obelisks, was 1868 in a state of almost complete ruin; it differs from the general form.

Other obelisks are noticed at Tanis; at Catania, which is a polygonal example placed on the back of an elephant; two at Constantinople; from which city another was taken about 1546 to Venice (GYLLIUS, p. 102): at Arles, placed 1675 on a pedestal; in the piazza di Sta. Maria Novella at Florence, placed on tortoises; and at Benevento.

Among modern examples of any interest or size, are several at Naples; at Seringapatam, 1805, in memory of Josiah Webbe, of granite, 60 ft. long, 6 ft. square at base, the work of Hindoos,

who moved it two miles from the quarry; this operation and the mode of raising it, are described in the Edinburgh Phil. Trans., ix, 312; and in *Egyptian Antiquities*, 8vo., 1832; at Appuldercombe, in the Isle of Wight, to Sir R. Worsley, 1774, of Cornish granite, 70 ft. high; at Aberdeen, to Sir J. McGregor, 72 ft. high of Peterhead granite, the shaft 48 ft. long (B. xviii, 167); and at Chester, 15 ft. of Halkin limestone, cost £200 (p. 144). At Bradford, Yorkshire, is the obelisk 21 ft. long, of silver grey granite from the Fell Hill quarry, near Creetoun, Kirkcudbrightshire, exhibited by Mr. Sim, at the Industrial Exhibition, 1862, in London. "The largest obelisk ever known to have been cut from the granite quarries in the neighbourhood of Aberdeen has just been hewn from the Stirling Hill quarry: it measures 25 ft. in length, and weighs 16 tons, and is worth in its rough state upwards of £200 sterling: it is a beautiful piece of red granite, entirely free from flaws; August 6th 1871." A monolith was proposed for the Prince Consort memorial in Hyde Park, London: on the 14th March 1862, the Ross of Mull granite company stated that a block of red granite, about 106 ft. long and 12 ft. square, could be obtained from a quarry belonging to the duke of Argyll, as described with the expenses of quarrying, etc., in Builder *Journal*, 1862, xx, 203; Society of Arts *Journal;* and Building News *Journal*, v. An obelisk at Brunswick is of cast iron; another, of bronze, 95 ft. high, is at Munich. 6. 25. 96.

Fontana, *Contignationes, etc. — ac descriptione — obelisci Vaticani*, fol., Rome, 1743. Bandini, *O. de Cesare Augusto*, fol., Rome, 1750. Zoëga, *De Origine et usu Obeliscorum*, fol., Rome, 1797. Dudley, *Naology*, 8vo., Leicester, 1846, p. 152. Jackson, *Church Antiq.*, 8vo., 1847, ii, 358, 366, 375. Builder *Journal*, xv, 621; xx, 211; *On Entasis of O.*, xvi, 432, 476; In Scotland, ix, 412; 478; xvii, 476; 357. Royal Institute of British Architects, *Sessional Papers*, 1857-8, p. 167, 170, etc., by R. Burgess and J. Bell. Rondelet, *L'art de Bâtir*, fol., Paris, 1812, pl. 1. *Notes upon Obelisks*, by Dr. S. Birch, in Falkener, *Museum of Classical Antiquities*, 8vo., 1862, ii, 203-39; 309. Ungarelli, *Interpretatio Obeliscorum Urbis*, 2 parts, fol., Rome, 1842, contains sizes and descriptions of eleven at Rome; also Parker, *Archæology of Rome*, The Egyptian Obelisks, 8vo., Lond., 1875, i, pt. 4. Society for the Diffusion of Useful Knowledge, *Egyptian Antiquities*, 8vo., 1832, i, 296, 355; ii, 376. Chambers' *Journal*, April 1862, p. 225, 432. Society of Arts *Journal*, 1837, li, pt. 2, p. 78, describes a bypole for building an obelisk 100 ft. high, invented by — Slack, of Laugholm, mason. Hittorff, *Pyramidions en bronze doré*, 8vo., Lond., 1836.

A list of many obelisks, with their sizes, in given in Gwilt, *Encyclopædia*, 8vo., 1876 edit.; another in Westropp, *Handbook of Archæology*, 8vo., Lond., 1868, p. 444. Those at Rome in the Penny Cyclopædia, 1840, *s.v.* Obelisk; and in Ungarelli.

OBERNKIRCHEN, in the comté de Schaumbourg in Hesse Cassel; in its vicinity are the largest quarries in Germany; they supplied the stone for the best houses in Amsterdam.

OBLIQUE ARCH, also called Skew arch. An arch of brick or stone formed aslant, instead of as usual at right angles to the abutment, and used where it is necessary for one line of communication to cross another in an oblique direction. The beds of the courses of an oblique arch consist of spiral lines wound round a cylinder, every part of which cuts the axis at a different angle, the angle being greatest at the keystone and least at the springing; and when so placed and viewed from beneath, they present the appearance of straight lines. Elliptical arches are the least suitable for an oblique plan; the difficulty also increases from 90 deg. to 45 deg., which is supposed to be the most unsafe angle for a semi-circular arch; the danger is less from 45 deg. downwards, and it may be safely built at an angle of 25 deg. nearly.

Nicolo Braccini of Florence, called Il Tribolo, designed and erected, *cir.* 1550, an oblique bridge over the river Mugnone, near Fiesole, "which was then a new thing and was much commended"; Vasari. Chapman, an engineer, built some skew arches previous to 1787 in Ireland, and wrote an account of his method of constructing them, in Rees, *Cyclopædia, s.v.;* he stated they had always been built in the same way as common square arches, the voussoirs being laid in courses parallel with the abutments, which is a very defective arrangement. On railways they were introduced by G. Stephenson. Buck was among the first who overcame the difficulties attending them in a satisfactory manner: the arch constructed by him over the road at Watford, on the then London and Birmingham railway, is considered an excellent model.

Fox, *Lecture on Skew Arches*, read at Royal Society; at Royal Institute of British Architects, 28th March 1836; printed in Philosophical Magazine, April 1836; and in Loudon, *Architectural Magazine*, June 1836: commented upon by C. L. O., in Civil Engineer, etc. *Journal*, 1838, i, 279, 313, 339. Nicholson, *Guide to Railway Masonry,— and Treatise on the Oblique Arch*, 8vo., 1839, having described *The Principles of Oblique Arches*, at the British Assoc. for the Advancement of Science, August 1838 (Civil Engineer, etc. *Journal*, i, 349). Hart, *Oblique Arches*, 8vo., Birm., 1836; 3rd edit., 1847. Buck, *Theo. and Prac. Treatise on Oblique Bridges*, 4to., 1839; 2nd edition, 1857. J. Morice's *Development*, in Civil Engineer, etc. *Journal*, 1845, viii, 277-9. Bashforth, *Construction of Oblique Bridges with spiral and with equilibrated courses*, 8vo., 1855. Corps of Royal Engineers, *Papers on Engineering*, 1844, etc., iv. Donaldson, *Oblique Arches with spiral courses*, 8vo., 1857; and late publications on Bridges. Penny Cyclopædia, *s.v.* Skew arch.

OBLIQUE BRIDGE. Its construction in timber or iron is comparatively easy, the ribs or girders being laid parallel with each other, but the end of each being in advance of that next preceding it. Adhemar, *Charpente, théorie des ponts biais en bois*, 8vo. and fol.

OBO, see Abo, in Finland.

OBRERI (Pierre), military engineer, directed 1336 to 1342 the building of the north portion of the palace of the popes at Avignon, for pope Benedict XI.

OBSCURED GLASS. The name given to white glass, not clear or fully transparent. See Glass (p. 47), for its varieties.

OBSERVANTINE MONKS, were a branch of those of Citeaux, see Cistercian buildings.

OBSERVANTS, were Friars, and a branch of the Franciscans, reformed about 1400, by S. Bernard of Siena, and confirmed 1414 by the council of Constance. They were also called Recollets. They were brought into England and settled at Greenwich by king Edward IV, in a monastery which was suppressed 11th August 1534, by king Henry VIII; refounded by queen Mary; they were again expelled 12th June 1559. 14.

OBSERVATORY. An astronomical observatory is either a permanent and solid structure, destined for taking and recording observations, which may be of fundamental or general interest and inquiry; or temporary and portable, having principally for its object observations for local or particular purposes. The purposes which it is intended that an observatory shall fulfil, and the magnitude and description of the instruments with which it is designed to be furnished, will, as a general rule, regulate its plan and dimensions. The piers for the reception of the instruments must not be connected with the walls of the building; they should stand on the firmest foundation; and be formed of one block of stone, or the beds be kept extremely thin, any settlement being ruinous to the nicety of the instruments. A dry situation should be chosen for the site, for no fire heat can be al-

lowed, and all brass work should be kept free from the action of moisture.

Weale, *Pictorial Handbook of London*, 1851, p. 630-98, gives the particulars of the observatories at Greenwich 1675: Kew 1842; Cambridge 1822-24; Oxford 1771; Chatham, and fourteen smaller and private ones, a few perhaps no longer exist. A list of *public* observatories in action about 1834, according to Prof. Airy's *Report* to the British Association, is given in Penny Cyclopædia, i, 537; and of twenty-seven principal public ones in Brande, *Dict. of Science*, etc., 8vo., edit. 1875. The *Memoirs* of the Royal Astronomical Society, 4to., London, 1822, etc., and *Monthly Notices*, 8vo., 1831, etc., describe several buildings: as that of Lord Wrottesley in Staffordshire, in January 1854; of Rev. C. Lowndes, Hartwell Rectory, March 1854; of R. C. Carrington, Red Hill, November 11th 1854(?); and 12th April 1854 gives an *Account of a portable Observatory*, by Thos. Dell, Esq., which cost only £37 10s. 5d. (Literary Gazette). Macvicar Anderson, *Orwell Park Observatory*, a paper read at Royal Inst. of Brit. Archts., *Sessional Papers*, 1874-75.

Among the noticeable edifices are the following: Dublin, Trinity College; description and plan, etc., in Gentleman's Magazine, 1788, pt. i, 292. Edinburgh, 1776, by J. Craig, completed 1792; erected 25th April 1818 (plan in Gwilt, *Encyc.*, 1876, Glossary). Armagh (Penny Cyclopædia, Supp.). Paris; 1667-72 by Perrault; its history is given in a *Report* by M. Arago, in Civil Engineer, etc. *Journal*, 1844, vii, 380. A moveable cupola was constructed 1843 to receive the great parallactic telescope, 40 ft. diam.; *Encyclopédie d'Architecture*, 3 pl.: Allgemeine Bauzeitung, 1854, pl. 619. Padua, *cir.* 1780, by D. Cerati, one of the most celebrated in Europe. Naples, by S. and L. Gasse. Warsaw, by P. Aigner, said to be the finest yet erected. Athens, by Schaubert, given in Architect and Building Operative *Journal*, 1850, ii, 175. Others at Hamburgh; Melbourne, etc. 6. 14. 25.

Dublin, Parsons Town, Lord Rosse's, has the largest reflecting telescope. London, Wandsworth, Rev. M. Craig, has the largest refracting telescope. One of the largest domes was that of Sir James South, at Kensington, 36 ft. diam.: it was said to be a total failure, though planned by Brunel.

The Royal Engineer Observatory at Chatham is given in Aide Mémoire, 8vo., Lond., 1850, p. 436-78, pl. 1-7; taken from Royal Engineers, *Papers*, etc., 4to., Lond., 1845, vii, 64.

Jey Sing (succeeded 1699-1743, and founder of Jeipoor or Jeinuggur) built the observatories at Delhi; the steps which form part of a gnomon attain a height of 56 ft. 9 in. (Daniell, *Oriental Scenery*, obl. 4to., 1815, pl. 19-20, reduced set); at Jeypore, Oojein, Matra or Mat'hara, and Benares; Dr. Fitzedward Hall, *Benares, Ancient and Mediæval*, states it was built by Mânasinha (perhaps Mân Sing, king of Ambêr, 1592-1615) about 1600, and Jey Sing supplied instruments of his own invention: Tod, *Annals*, 4to., Lond., 1829, ii, 357; a balcony from it is given in Fergusson, *Indian Architecture*, 8vo., Lond., 1876, p. 270. Asiatic Researches, v, 190. Le Comte describes a very magnificent one at Pekin, erected by the emperor of China at the instigation of the Jesuit missionaries.

"Portable observatories" are described in *Aide Mémoire*, 8vo., Lond., 1850, p. 436-78, pl. 8-14. An elevation of an "observatory" for establishing the working details of a tunnel, is given in Strickland, *Reports on Canals*, etc., fol., Phil., 1826, pl. 5. The Saltwood observatory, erected for forming the tunnel on the South Eastern Railway, is described in Simms, *Practical Tunneling*, 8vo., Lond., 1859, p. 20-30.

OBSERVATORY. A term applied to a "look-out place". One of a very large size called the Latting observatory was erected of timber at New York in 1853, as an octagon tower 75 ft. diam. and 350 ft. high to the top of the flag pole, having a first look-out platform at 125 ft., a second at 225 ft., and a third at 300 ft. A steam elevator in the centre had a well-way 15 ft. diam. up to the second level. It was probably removed in about ten years; Builder *Journal*, xi, 343. Gazebo.

OCCUPATION BRIDGE (Fr. *passerelle*). A bridge erected for the convenience of access of the landowners of property severed by a canal, a railway, or a common road. Such a bridge may be either foot, bridle, or a cart bridge, and for the latter the incline does not usually exceed one in sixteen, though in hilly districts it may be as much as one in eight. One of 52 ft. 6 in. span, near Paris, is given in Daly, *Revue générale*, 4to., Paris, 1849, viii, pl. 8.

OCEANUS. In mythology, a powerful deity of the sea, who is usually represented as a very aged man, with a venerable flowing beard, and riding upon the waves of the sea. Sometimes he holds in his hand a pike, while a sea monster stands near him, and in the distance ships are seen under sail. His offspring are the most celebrated rivers, with a number of daughters who are called from him Oceanides. 6.

OCHOA (Juan de) of Cordoba, had in 1593 taken part with Asensio de Maeda and Juan Coronado, in the examination of the plans made by Hernan or Fernan Ruiz III, for the repair and enlargement of the tower of the cathedral of that city. It would seem that in 1601 Ochoa was director of the works in the interior of the church; as in a petition to the chapter, Hernan as *maestro mayor* of the church requested that the new works may be given to him as chief, separately from those under the charge of Ochoa: it was, however, decided by the majority of the chapter that Ochoa should continue as already arranged. He succeeded Hernan as *maestro mayor* from 1604 to 1606, in which year he probably died, as no further mention of him is found in the records. 66.

OCHRE. Hydrated sesquioxide or peroxide of iron. The *sil* of the Romans, and the ὦχρα of the Greeks. A genus of earths, slightly coherent, and composed of fine, soft, smooth, and argillaceous particles, rough to the touch, and easily diffusible in water. These earths are also mostly native, and of various colours, and comprise blue, brown, black, English, orange, Oxford, purple, red, Roman, stone, terra di Sienna, and yellow, which is the one most prevalent and best known; all are explained herein with their various cognomens. They have hitherto been considered valuable for their permanence in oil, water, crayons, distemper, and fresco.

Attic ochre, as a yellow, was one of the four colours used by the earlier Grecian masters, and was most highly esteemed: the ochre of Achaia was used in shades; and the Gallic or shining ochre for lights, and was the cheapest: Library of Entertaining Knowledge, *Pompeii*, 8vo., Lond., 1832, i, 52-8. Burnt ochre is stated by Pliny, xxxv, 6, 20, to have been accidentally discovered and used by Nicias, son of Nicomedes, in his paintings, *cir.* Olympiad 118. Burnt ochre of the present day makes the colour known as light red. Ochre was used 17 and 18 Richard II (1393-5), *Archæologia*, xxiv, 304: and about 1700 they were known as "Oaker, a brownish red, a natural earth; yellow oaker, a natural earth which turns red by burning; dark yellow or Ruth oaker, a slimy earth in iron mines and calcined. Yellow oaker of Naples, a kind of slime in sulphur mines, not so good as the native yellow; and red oaker, a natural earth found in England, and used instead of lake: all are good for fresco (distemper?) or oil painting". 4. 6. 9. 25.

Mr. C. W. Cope, R.A., has forwarded the following communication: "Yellow ochre being mentioned by all early writers as one of the most durable of colours, was considered safe and consequently adopted freely in the first efforts in fresco painting *(fresco buono)*. After some years, it was observed that decay had commenced in those works, and an examination was made, when it was found that one *principal* cause of that decay was the use of ochre. Wherever used in a pure state, or if largely mixed in a tint, it was found to have burnt through the transparent surface pellicle, and remained on the surface or fell off in a fine powder. Ochre rapidly ab-

sorbs water: if ground with oil and placed under water, it will discharge the oil for the sake of the water. Its absorption of damp therefore renders it ineligible for fresco painting, and the use of raw Sienna becomes preferable. Terra-verte has the same tendency to absorb water. Having abandoned the use of yellow ochre, I cannot say how it behaves under the protection of water-glass. The chemical relations of colours with lime, and all the causes of decay, etc., are treated in a very able report by F. Wright, chemist, of High Street, Kensington, on fresco painting in the Houses of Parliament, printed by order of the House of Commons, dated 12th February 1872, which should be referred to for further details.

OCRICULUM; the modern Otricoli, in Italy.

OCTAGON. An eight-sided figure. A regular octagon is equiangular as well as equilateral. To draw one without a plan, has been explained thus: $\left|\frac{34}{12}\right|\frac{5}{\text{parts}}\left|\frac{34}{12}\right|$ in Building News *Journal*, iv, 1230, 1262, 1281, and 1301. To find its area, multiply the diameter by twice one side; and its diameter is to the side as 17 to 7 nearly; Duesbury, in Builder *Journal*, 1861, xix, 218. Its area is also said to be 4·8284271 times that of the square on one of its sides.

The octagon form was usually adopted in the ancient baptisteries of Christianity, as that of S. John Lateran at Rome, at Florence, Perugia, Pisa, Parma, and other places in Italy. Among other octagon buildings (*Illustrations*, Church Plan, 1857-58, pt. 1) is a church of early date at Hierapolis, circular inside; at Antioch, and at Nazianzum, they were octagonal like baptisteries. At Paris, is one in the hôpital général de la Salpétrière. S. Borgo, at San Donino (Leclère, *Recueil*, pl. 49); at Prague, the Karlshofer church (Wiebeking and Grueber); at Asti, S. Pietro (Osten); S. Michel d'Entraignes, dept. of Charent (de Caumont, *ABC Arch. Relig.*, 69, 97); Sta. Maria della Passione at Milan; Sta. Croce at Riva (Tessino); cathedral at Aix-la-Chapelle; and SS. Sergius and Bacchus at Constantinople. In England, is Stoney Middleton, Derbyshire; and Ayott S. Peter's, Hertfordshire (pulled down): S. Dunstan's, Fleet Street, London; and S. Alkmund's(?), Shrewsbury, are both modern examples. The same form has also been adopted for chapels, chapter houses (*s.v.*), towers, columns, spires, lighthouses, and other erections.

OCTASTYLE. A façade having eight columns in front. A dipteral temple had a pronaos and posticum, and two ranks of columns all round the cell. The octastyle pseudodipteral was the invention of Hermogenes, who was the first to omit the inner ranges of columns, and so saved a considerable expense; Vitruvius, B. iii, chap. 2.

OCTAVIUS PAL. FRUCTUS (C.), occurs in an inscription in Doni, *Inscr. Antiq.*, 316: and given in Sillig, *Artists*, etc., 8vo., Lond., 1836, p. 135.

OCTOPARTITE VAULTING. "It would be difficult to find a system of vaulting more unlike any example that there is in England than the Angevine vaulting generally, of which the hospital at Angers in France is a fair specimen. It is always excessively domical in its sections, both longitudinal and transverse; and having eight ribs, forms, in fact, an octopartite vault. There is nothing at all analogous to it at Canterbury, or elsewhere in England, to the best of my belief;" Street, in Builder *Journal*, 1859, xvii, 24, who puts forward the claim of the hospital to be the earliest Gothic building in existence. *Illustrations*, Hospital of S. John at Angers, *s.v.* Groined Vaulting, 1861, pt. 1.

ODAM (Girolamo) of Rome, born 1681, originally of Toul in Lorraine, also a painter and sculptor of high merit, studied under Carlo Fontana, and made many designs following the ancient style. 5. 30.

ODDI (Muzio), was born 14th October 1569, at Urbino; his father Lactantius was an officer in the troops of Francesco di Medici. Learning drawing of F. Baroccio, and exercising his talent for mathematics and construction, he entered the army, became chief of artillery, was admitted a member of the privy council, but was soon after (1600) imprisoned at Pesaro for nine years; after his liberation he left for Milan, where he became professor of mathematics, and made *cir.* 1609 several designs for works at the cathedral. In 1626 he fortified Lucca, for which he was presented with a medal of honour by the authorities; and was probably present at some of the battles ending with the sack of Mantua *cir.* 1630. Invited by cardinal Trivulzio to return to Milan, he preferred to proceed to Loreto, where he designed the sacristy; and executed works also at Ancona. Shortly afterwards he obtained permission to return to Urbino, where he died 15th December 1639, at the age of seventy years. Some of his writings, purely mathematical, are still extant. Two volumes of drawings by him, proving his fame as a great military architect, are in the royal library at Windsor Castle, and were described by Ashpitel, at the Royal Inst. of Brit. Archts., *Sessional Papers*, 1861-62; and Builder *Journal*, xx, 464-5; and his MSS. are stated to be in the Vincenzi library at Urbino; some works were published by him 1614, 1633, and 1638, 4to. He had a brother Matteo, who published *Precetti di Architettura militare*, 8vo., Milan, 1627. 112.

ODEION, Odeium, and Odeum. A public building or theatre first erected by the Greeks in the fifth century B.C. for musical performances and instrumental concerts, and for rehearsals in connection with the choruses of the theatres, and in which also prizes were contended for. Gibbon, *Decline*, 8vo., London, 1853, i, 61. The scholiast of Aristophanes (in *Vespis*) describes "an odeum as a place in the form of a theatre, in which poems used to be recited, previous to their being acted in a theatre;" and Vitruvius, B. v, c. 9, refers to the odeum that Pericles built at Athens; and from this statement and from Plutarch, in *Pericl.*, it may be concluded that the odeum had the form of a theatre; that it differed from it in being furnished with a covering; that it wanted the *scena*, but had a stage for the musicians; and that being erected near a theatre, it might with its porticoes and covered passages serve for shelter to those who, being present at the spectacle, might be surprised by showers. No ancient writer has given a description of such a building.

At Athens, Pericles built the first odeum of which any notice is left: it was burnt by Ariston, destroyed by Scylla B.C. 85, repaired by Mutius and Menalippus B.C. 65-51 for Ariobarzanes II, and has now quite disappeared. That at Patræ was very magnificent; as also that at Corinth erected by Herodes, near the fountain Pirene. At Smyrna, celebrated for its picture by Apelles; at Tralles; at Messene, 112 ft. long and 93 ft. in its inner diam.; at Nicopolis, with the same inner diameter and an outer one of 193 ft.; at Pompeii, also called the "comic theatre"; at Laodiceia ad Lycum; one at Carthage built by Septimius Severus; at Posilippo; and at Athens, where was that of Regilla erected by Herodes Atticus. Pausanias, vii, 20, 3, mentions this odeum as the finest in Greece, excelling all others in dimensions and magnificence; and observes that it was not included in his description of Attica, because that work was completed before the edifice was commenced. The excavations carried out in 1857-8 have disclosed the interior in a state of preservation sufficient to explain its arrangements and magnificence. The plan is a semicircle 248 feet diam., the ranks of seats rising up the south-west slope of the Acropolis, below the temple of Nike Apteros: it would probably seat between 6000 and 8000 spectators. The roof was of cedar richly decorated; and it was burnt probably at the third invasion of Alaric in 402. This edifice is fully described in Breton, *Athènes*, 8vo., Paris, 1868, p. 286-298. In Rome, the memory only remains of the odeum of Domitian, and that of Trajan erected by Apollodorus. At Acræ, in Sicily, was perhaps the first discovered example of the Greek odeion; the orchestra was about 19 ft. diam.: and the one at Catania is placed on higher ground than the theatre, although contiguous to it, as a difference of nearly

forty feet exists between the levels of the two: Goldicutt, *Antiquities*, fol., Lond., 1819, pl. 59: they are both given in Faso Pietrasanta (the duke of Serradifalco), *Antichità*, fol., Palermo, 1834, v. A. C.

Martini, *Ueber die Odeen*, Leipzig, 1767. Tuckermann, *Das Odeum d. Herodes Atticus u. der Regilla in Athen restaurirt*, 8vo., Bonn, 1868. Rose, *Ueber die Odeen in Athen, Rom, v. Karthago*, 4to., Soest, 1831. Falkener, *Museum of Classical Antiquities*, 8vo., Lond., 1852, ii, 240-51, referring to the odeum at Acræ. Leake, *Asia Minor*, 8vo., London, 1824, p. 328-9. 6. 25. 78.

ODENSE (Latin Othensia; Dan. Odins-gy, Odin's Island). A seaport and the capital of the isle of Funen on the north bank of the Odense-Aue, in Denmark. It is said to have been founded by Odin B.C. 70, and is the see of a bishop. The large Gothic brick cathedral dedicated to S. Knud or Canute (killed 1086), one of the finest in Denmark, was founded by him, but probably rebuilt *cir.* 1300: the tower is about 16th cent. date. Here are buried several Danish kings. The shrine of S. Canute is a singular example of Romanesque woodwork. There are two other churches, one of which, the Vor Frueskirke, has an altar piece 10 ft. wide and 16 ft. high, with over 300 figures, carved by Claus Berg of Lubeck, at the close of 15th cent.: a fine old council house or state hall: a small palace containing a good collection of Northern antiquities, and 1871 the Lassen collection especially of the stone age: a large and richly endowed hospital, etc.; and a bronze statue of king Frederick VII, by Bissen, *cir.* 1848. 28. 50.

ODEYPOOR, see Oudeypore, in Hindostan.

ODEUM, see Odeion.

ODINA WODIER. A large tree, native of mountainous districts in Southern India. It is difficult to season, but when well-seasoned, the central reddish portion is useful for many purposes. It weights 41 lbs. per cubic foot.

ODO, prior; see Croyland.

ODO and Wimbolde, Wirmbolde or Wimmbolde, *cementarii*, named in an ancient necrology, are cited by Felibien, *Vies*, iv, 193, as the architects or designers of the church of S. Lucien at Beauvais, the nave of which was rebuilt about 1078, by the latter, and the tower by the former workman. 19.

ODO, abbot of S. Denis, see Clement (E.)

ODO Aurifaber, was *custos operationis* (architect), at the palace of Westminster, 2nd Aug. 1237, *temp.* king Henry III, when certain payments were made to him for making pictures, and for oil, varnish, and colours. He is supposed to be the father of Edward Fitz-Odo, named 1238-39, who afterwards held the same office (architect), and is also termed 1244 Edward of Westminster; was 1246 appointed treasurer of the exchequer, together with the archdeacon of Westminster; and shortly after, his uncle John le fusor transferred to him the office of *fusor* or melter to the king's exchequer, in consideration of twelve marks of silver towards the expenses of his voyage to the Holy Land; this was confirmed by the king. Brayley and Britton, *Palace*, etc., 8vo., 1836, 46-7; 51-3. Walpole, *Anecdotes*, edit. Dallaway, 1826-28, i, 10-17; 210. Hudson Turner, *Domestic Arch.*, 8vo., London, 1851, p. 89, 94, 260. 19.

ŒCUS (Gr. δικος) wrongly written Æcus. A spacious hall or saloon, frequently adapted for the *triclinium*, but larger on account of the necessary columns; there were four sorts: 1. The *Tetrastyle*, in which four columns supported the roof. 2. The *Corinthian*, having one order of columns supporting an architrave, cornice, and an arched roof. 3. The *Egyptian*, in which the pillars supported a gallery with a paved floor, forming a walk round the apartment: above these pillars others were placed one-fourth less in height; and between the upper columns were placed windows, as in the hypostyle hall at Thebes. 4. The *Cyzicene*, which looked to the north, and if possible faced gardens, to which it opened by folding doors, being used in the summer time.

A unique example of an *Egyptian œcus* (Vitruvius, vi, 5), probably existed in an apartment of the house of the Nereids, at Pompeii; there is a staircase at the back, which may have led to the gallery. An example of the *Corinthian œcus* probably occurs in the house of Joseph II, at Pompeii. The *œcus Cyzicus* (Vitruvius, vi, 6), was a Greek great dining room richly decorated. Its size was to be such as to allow of two *triclinia*, or tables with their couches facing each other, with ample room for servants to pass round, to be placed in them. The house of Pansa, at Pompeii, shows probably both the winter and summer œcus. An *œcus Cyzicus* in the house of Diomedes, measures 36 ft. by 26 ft., all the windows of which opened almost to the level of the floor, giving a view of the garden, surrounded by terraces and trellises. On the south side of a Greek house (Vitr., vi, x) were *square œci* of such ample dimensions, that there was room therein for four triclinia and the attendants, as well as for the games: they were for men only. 78.

ŒFFNER or Effner (Joseph), studied at Paris at the expense of the elector of Bavaria, and on his return 1715 was made hofbaumeister to that prince, who sent him 1717 to Italy to study the principal edifices of Rome and Venice: in 1725 he was named his hofkammerath, and oberbau and gartendirektor, in which employment Œffner died in 1745. Lipovsky, *Baier. Künst. Lex.*, 8vo., Munich, 1810, suggests from Westenrieder, *Beschreibung*, 8vo., Munich, 1782, p. 365, that Œffner built the lustschloss Schleissheim, which was by H. Zuccali 1684, or perhaps he finished it 1704 according to Nagler, *s.v.* Zuccali; but if finished by Œffner, he could not have been young when he went to Paris; and Zuccali was [not gone 1694 or dead but] at Munich 1732 according to Lipovsky, from an account book. 68.

ŒIL DE BŒUF. A French term in use in this country for a small round or generally oval window for letting light into a roof. There are three ranges of such in the dome of S. Peter's at Rome. 25.

ŒILLET, see Oilet.

OEKL (Jacob von), built 1702 the church of the Pilgrimage (Wallfahrtskirche) at Kaltenleutgeben, in South Austria. 26.

ŒNSINGER, see Ensinger.

ŒSLER, see Eseller (N.)

OFEN (so called by the Germans; Sclav. *Budin;* Hung. Buda). A royal free town, the metropolis of the kingdom of Hungary since 1784, situated on the south or right bank of the river Danube, here 1408 ft. wide, and opposite to Pesth, with which it communicates by a suspension bridge, one of the grandest in Europe, designed 1840-49 by Tierney Clark; it cost £460,114: the central waterway is 627 ft., and each side opening 271 ft. wide, with a roadway 25 ft., and two foot paths each 6 ft. in width, and 43 ft. above the ordinary level of the river: all its details are given in Hann and Hosking, *Bridges*, 8vo. and fol., Lond., 1852, Supp., in 37 plates, with a plan of the towns. Buda consists of an upper and a lower town of five suburbs, having wide streets, but only remarkable for the palatine's or viceroy's palace, built of a square form, containing 203 rooms, built 1711-41 in an Italian style, with a façade 564 ft. long; in the left wing is a chapel containing the Hungarian regalia. The palace, much injured in the bombardment of 1849, has been restored in a better style: a Gothic canopy in bronze in its square commemorates Hentzi and his companions who fell with him while defending the fortress in 1849. A royal palace on the south side of the fortress walls is now contemplated; an elevation is given in Builder *Journal*, 1876, p. 974. The other public buildings are of little importance. There are altogether thirteen churches, of which one, with a bishop's palace, belongs to the Greek communion; that under the invocation of the Assumption dates *cir.* 1250-1575; that of S. Sigismond 1789; of S. Anne; the garrison church (mediæval); those of the Capu-

chin and Franciscan convents; of S. Catherine, Roman Catholic; and of S. Elizabeth, erected on the site of the chief mosque built by the Turks, who during their occupation of the city 1541-1686 built more than twenty mosques and other buildings; among which now remaining are an octagonal tomb with a dome, of the sheikh Gül Baba, a fort with four round towers now a corn mill, and three public baths still used by the lower orders; a sketch taken about 1669 of the plan of that of Veli-bey, being a square comprising five circular baths with domes over them, the central one supported by twelve columns, is in the British Museum, Sloane collection, Add. MS. 5233, f. 14; and a view of one is in the work by Alt. The synagogue is one of the richest in Europe. There are also six hospitals, the "plague" column or of the Holy Trinity 1710, the shaft about 52 Hung. ft. high; large theatres, and two large schools. 11. 26. 28.

Alt-Buda or Alt-Ofen, higher up the river (the *Sicambria* of the Romans) is undoubtedly the embryo of Buda; it was a Roman station of some importance in the early part of the third century. Many antiquities still exist within it. The real-school, by prof. Petchnig, 1857-59, is given in Builder *Journal*, 1860, xviii, 737.

Scham, *Beschreibung*, 8vo., 1822. Miller, *Res memor. de urbe Budensi*, 4to., Budæ (1761), with maps. Schier, *Buda sacra sub priscis regibus*, 4to., Vienna, 1774. Rudolf Alt, thirty-two original drawings of the palaces, public buildings, etc., in Buda and Pesth, obl. 4to., Pesth, 1845. Marmier, *Du Rhin au Tyrol*, etc., 8vo., Paris (1846). Beattie, *Danube illustrated*, 4to., Lond., 1844.

OFFERTORY WINDOW, see Low side window.

OFFICES or Domestic offices. The rooms in a residence, and used by the servants. These are attached to the house on the ground floor in a country house, and in the basement of a town house, and comprise generally the kitchen, rooms for upper servants and lower servants, laundry, bakery and brewery; the cellars, storage, and outhouses, servants' private rooms, the supplementaries, and thoroughfares. In further detail they comprise the kitchen, butler's pantry and its appurtenances, housekeeper's room, still room, store room, china closet and scullery, steward's room, servants' hall, gun room, housemaid's closet and cleaning rooms, etc., luggage entrance, scullery, larders of various sorts, pastry room, kitchen court, which will probably have the minor offices and outbuildings around it, salting and other rooms, dairy, bakery, brewery, beer, coal, and wood cellars, ash bin, ice cellar, pump room, and kitchen entrance; also the laundry, if not removed to a distance. The offices when placed in a basement can never be expected to be so convenient as when they are disposed above ground; attention must then also be directed to the protection of the principal living rooms from the noise of what passes below, and to arrangements for preventing interference with their privacy. Kerr, *Gentleman's House*, 3rd edit., 8vo., Lond., 1871, 198-256. 6. 25.

OFFSET or set-off, see Weather table.

OFFSET. A line drawn perpendicular to the chord of an arc, from points in the arc, or to the longest base of an irregular polygon, from corners of the polygon. It is also the length from a supposed right line, as a chain in measuring land, to the junctions of angles, or line of a curve, which may be a hedge or fence, taken in order to draw the same on the plan, or by means of which the area may be calculated. This distance or length is measured with a tape, or usually with the "offset staff", being a rod of about 10 links or 6·72 feet in length. A silver medal was awarded to Mr. J. G. Austin, for a "double offset plotting scale" at the Society of Arts, etc., 1841. 14.

OGÉ. This term occurs in the *Accounts* of N. Udwart, treasurer of Heriot's hospital, Edinburgh, 1628-31: "Item (the 30 Maij 1629), to the measones, at the casting over the ogé of the kitching chymlay, in drink, xxiiis"; *Transactions* of the Arch. Inst. of Scotland, 1852, ii, 37.

OGEE (It. *gola inversa* or *rovescia;* Sp. *talon;* Fr. *talon.* Dürer calls it *schlangen lini;* Ger. *kehlleiste; glockenleiste,* or decorated (no bead) *carnies mit herzblatter*). The name of a moulding used in architecture. This word has been derived from *auge*, a trough or channel; but more probably from *auge* and *giver* (or *girer*) to twist about (Cotgrave); *givre* is also French for a serpent. "OG" occurs in the translation of Hans Bloome, *Architecture*, 1674, and is applied to the cymatium; Evelyn, *Parallel*, 1664, alludes to "Ogee, as our workmen barbarously term it". This term is *now* given to an upright double curve, *convex* at top and *concave* at bottom; the "Cyma" or "Sima reversa" of the Latins (Cyma, illust. b); the reverse curve or cymatium is sometimes called by workmen, a back ogee. In English mediæval nomenclature such a molding is called a *ressaunt;* Willis, *Nomen.*, 4to., Cambridge, 1844, p. 5. Inigo Jones, in his notes to Palladio, published by Leoni, fol., Lond., 1742, calls it "wave molding", though applied sometimes to the cymatium. It is also called a *talon* or heel molding, or inverted ogee. Neve, *Builders' Dict.*, 8vo., Lond., 1736, 3rd edit., describes "OG, Ogee, or Ogive, a sort of moulding consisting of two members, the one concave, the other convex. Vitruvius makes it two quarter circles; Scamozzi and some other authors make the arches flatter by striking them from two equilateral triangles". Neve adds "Cyma, Cymaise, or Cymatium, is what in English we call Ogee, Ogive, and sometimes barely OG. It is a molding waved on its contour, *concave* at top and *convex* at the bottom, used for the uppermost members of large cornices": which is also called "cyma recta" in Moxon, *Mechanick Exercises* (Bricklayer), p. 28-9, 30. The Latin word *Augiva*, used in 1507 is translated into French *Ogive* or *Augive*, in Du Cange, by Charpentier, fol., 1766. *J. w. p. 16. 17.

OGEE ARCH or contrasted arch (It. *inflesso; contrecurvo;* Fr. *inflexe; contre-courbe*). An arch struck from four centres, two in or near the springing, and two others above it, reversed. An early, if not the earliest, specimen is in a tomb in the north aile in Salisbury cathedral, dating about 1246. A two-light window from Ravensthorpe church, Northamptonshire, fig. 39; and a three-light from Staines, Middlesex, fig. 43, are given in Freeman, *Window Tracery*, 8vo., Lond., 1851. A church near Canterbury has one or more windows with such an arch of a flatter form. Langley calls it a "hare-lip arch". It was used by the Arabs in the thirteenth century; and in Europe in the fourteenth; Schmit, *L'architecte des monumens religieux*, 8vo., Paris, 1845, p. 277. Selvatico, *Arch. in Venezia*, 8vo., Venice, 1847, p. 126. 19.

OGER (Benito or Benedicto). A native of Alió, in Spain, living in Cataluna in 1510, and considered a good architect. The parish church of Reuss in the archbishopric of Tarragona, was then being enlarged by considerable additions; a copy of the agreement for which, between Oger and the town authorities, is printed in Llaguno, i, 290. Another enlargement in 1545 was executed by D. Sarona, in consequence of the death of Oger. 66.

OGGIFS. A term used in the Ely Sacrist's Roll, 31st Edward III, "in 56 pedes de oggifs empt." quoted in Willis, *Arch. Nomenclature*, 4to., Cambridge, 1844, p. 11, who says "the *oggifs* occur amongst some other entries relating to the construction of two north windows 'ad tria altaria' in the cathedral of Ely. Upon examination of the locality it appears that these can only be the two windows in the north aile of the choir which are the fourth and fifth in order from the transept wall, and which are manifest insertions, replacing Early English windows. Now the sill-tablets of these windows are made up of *ressaunts* or ogee moldings, excepting one *casement*", and the aggregate length of the interior and exterior tablets is 53 ft. 1 in., which, allowing for the difference of standards or waste, etc., "is so near to 56 ft., that we can hardly doubt but that they are the *oggifs* in question." Willis gives sections of both of them. *J. w. p. 16.

OGIER FAIGOT. One of the architects of the cathedral at Troyes, who 1419 superintended the portal and the walls of the church. His sons Thevenin and Jean were employed upon them. LANCE, *Dict. Biog.*

OGIVALE. The term applied by the French architects and archæologists to the architecture of the mediæval period in France, and during which the pointed arch was used. FRENCH ARCHITECTURE, p. 95.

OGIVE. The term applied in France to the *pointed* arch generally, and neither to the "ogee arch" nor to moldings of any kind; but this does not seem to have been its original meaning. DE L'ORME uses "croisée d'ogives" and "ogives", for the diagonal rib of a vault only, and it is defined in the same way in the *Dictionaries* of FELIBIEN and of D'AVILER; also in VIOLLET-LE-DUC, *s.v. Symétrie*, p. 513. It may have been so named from the ogee molding, which is its universal form. This, however, is just as applicable to the other ribs of the vault; and the same may be said of the pointed form. The Dutch apply *odijf* to the hollow molding and the inflected molding indifferently. *J. W. P.

OGIVE. A term used for an arch of a Gothic vault, which instead of being circular passes diagonally from one angle to another, and forms a cross between those other arches which make the sides of the square of which the arches are, diagonal: NEVE, *Builders' Dict.*, 8vo., Lond., 1736, 3rd. edit.

Ogive, a pointed arch: "C'est ainsi que le nom d'ogive est entendu dans l'usage vulgaire, et que nous devons par conséquent l'employer pour être entendus nous-mêmes. Mais les archéologues protestent contre l'inexactitude de cette expression, qui, jusqu'au commencement de ce siècle-ci, où l'erreur a été commise, n'avait jamais désigné que les nervures de deux voûtes qui se croisent, quelle que soit d'ailleurs la courbure de ces voûtes. C'est un mot qui a fait fortune justement parce qu'on n'en connaissait pas le sens." BORDIER et CHARDON, *Hist. de France*, 8vo., Paris, 1859, i, 401. 25.

OGNIBENE (ADAMO), with Tiberio Ossolaro of Cremona, designed 1107-90 the cathedral church of that city, in a basilican form, which 1288-1343 was made into a Latin cross. 57.

OHLMÜLLER (DANIEL JOSEPH), was born 1791 at Bamberg. After studying under Karl Fischer, he visited Italy and Sicily for four years, until summoned home to superintend the erection 1816-30 of the Glyptotheca, at Munich, after the designs of L. von Klenze. In 1831 he commenced the design of the church of S. Maria Hilf, in the Au suburb (Gothic of 13th and 14th cent.), but not completed at his death; it is described in the ECCLESIOLOGIST *Journal*, iv, 87; WEBB, *Ecclesiology*, 8vo., 1848, p. 144, and BUILDER *Journal*, 1858, xvi, 232. He also designed the church of S. Theresia at Hallbergmoos (Italian) begun Oct. 1833; 183 -35, the national Bavarian monument (Gothic) at Wittelsbach; and 1834, the Otto chapel at Kiefersfelden (Gothic). On the death of D. Quaglio in 1837, he completed the works at the castle of Hohenschwangau: and was appointed *civilbau-inspektor* at Munich, where he died 22nd April 1839. He published *Monuments Funéraires*, Munich, 1824-39, in 17 plates of his own design. 14. 68. 112.

OHOSAKA. One of the five imperial cities of Japan, situated on the left bank of the river Jedogawa, which runs into the bay of Ohosaka. The city is described as equal in size to Nagasaki, and appeared to be the Paris of Japan. "Here are the most sumptuous tea houses, the most celebrated theatres, the most extensive pleasure gardens"; L. OLIPHANT, *Narrative*, 8vo., Edinb., 1859, ii, 262.

OIA or OYA (S. D'), see NOY (S. VAN).

OIL. An unctuous inflammable substance, drawn from various bodies, both animal and vegetable. From the peculiar properties of different oils, they are naturally divided into two kinds, the *fixed* or fat oils, and the *volatile* or essential oils. In the arts, the former are of the most extensive utility. They are generally yielded by the seeds of plants, and by some fruits. They are composed of oxygen with hydrogen, and a large proportion of carbon; are inflammable, odourless, insoluble in water and in alcohol, and with alkalies form soap. They are also coagulated by metallic salts. When exposed to the air they harden. Oils which become so hard as not to stain paper, are called drying oils; such are linseed, poppy, and nut oils, but with the latter "driers" are introduced: these are the principal oils used as vehicles for mixing colours for painting. Oils which will not thus harden are termed unctuous oils, as oil of olives, of sweet almonds, rape oil, castor oil. *Drying oils, i.e.*, oils boiled with sugar of lead, white vitriol, red lead, or other substances possessing similar properties, which go chiefly to make up painters' varnishes, dry up into a transparent yellow flexible substance with a skin formed over the surface of the oil, by which all alteration of condition is stopped. When boiled with litharge or oxide of lead, they become even more drying. The common kinds of drying oil are generally known by the name of *boiled oil*. Walnut oil is even more rapidly drying than linseed, and is used chiefly for paints and varnishes, and, because it becomes white by age, for white paints. Poppy oil heated with litharge or sub-acetate of lead is used for paints. Hempseed gives a capital oil for varnishes. DRIERS. LINSEED OIL. 14 and supp.

CLARK, *The Oilman's Guide*, etc., 8vo., London, 1831. THOMPSON, *Oil and Colourman and Painter's Manual*, etc., 8vo., Lond., 1863. The new *oil tester*, licensees, 1868, J. Bailey and Co., Albion Works, Salford. "On some malverse reactions occurring in oil paint compositions", by C. Binks, in BUILDER *Journal*, 1861, xix, 15 *et seq.*, as commented upon, *s.v.* LINSEED OIL. "On the oils hitherto used in Painting", etc., W. M. Dinsdale, in CIVIL ENGINEER, etc. *Journal*, 1845, viii, 5, 38, 208. MINERAL OIL, see PETROLEUM.

Oils should be pale in colour, limpid, and transparent, and should dry quickly—that is, nut oil in a few hours, linseed in a day, and poppy in thirty-six or forty hours according to the state of the atmosphere. The pigments exert a considerable influence on the oils drying: thus ivory black, vandyke brown, the madders, vermillion, and some others, retard the drying of the oils with which they are mixed; while others, such as Prussian blue, light red, terra-verte, and umber, accelerate that result. The *essential* oils used in painting, are TURPENTINE for diluting the pigments ground in oil, and spike or lavender for wax and enamel painting: FAIRHOLT, *Terms in Art*, 8vo., London (1870).

Oil has a peculiar facility for developing heat: SPONTANEOUS COMBUSTION. If hemp, wool, paper, sawdust, rags, soot, shavings — or other such refuse — be smeared with oil and left to the free action of the sun and air, they will soon get hot, begin to smoke, and finally burst into flame: which accounts for many of the apparently mysterious fires of mills and manufactories. If linseed oil and ground manganese are triturated together, the soft lump so formed will speedily become firm, and take fire of its own accord: ALL THE YEAR ROUND *Journal*, No. 211, May 9th 1863, p. 264.

OIL CLOTH. Coarse canvas, covered with many coats of oil paint to procure a surface, which is finished with a pattern printed upon it by wood blocks, of another or many colours. "Oil baize" is a finer sort of the same manufacture.

OIL COLOUR. In the present day it is another term for OIL PAINT, and may be said to be used for the latter when much diluted by turpentine and other materials so as to be little better than distemper.

OILET or OILLET, OYELET, EYELET, OYLET, ŒILLET, OILLETTES. A small opening or loophole, sometimes circular, extensively used in the fortifications of the middle ages, to descry the operations of the besiegers unobserved, or through which to discharge arrows against assailants, while the soldier was protected in the embrasures. The triangular sinking at the back of each cusp point, in Gothic tracery, produced by the intersection of the moldings, is also called an oilet.

OIL MASTIC, see MASTIC.

OIL PAINT. Paint in which the medium for using the colour consists partly of oil; or if no colour be used, then the oil is mixed with white lead or with zinc; and with these a colouring matter generally in such quantities as may be necessary to produce the tint required. Paint may be applied on brick and stone, plaster, wood, cloth, stones, glass, and all sorts of metal. The substance, if an absorbent material, has first to be prepared by a primer, or PRIMING COAT or coats, to prevent the material absorbing the oil from the better coats of oil paint, which are subsequently added. In the best apartments the work is finished by a flatting coat, composed of the oil paint and much turpentine mixed with it. ATMOSPHERIC INFLUENCE. LACBORACIC PAINT. PAINTING.

OIRA (SEBASTIAN DE), designed the great chapel of the monastery of the Premonstratensians of N. S. de la Vid, near Burgos, and dying in 1542 it was continued by his nephew and pupil Pedro Rasinas. 66.

OKEL. The name applied in Egypt to those buildings, which serving at once as inn, storehouse, bazaar, and exchange, are in Turkey and Persia called Caravanserai. A large covered court constitutes the okel proper; this is surrounded generally by two stories of galleries, the lower one used as shops, stores, etc., and the upper one appropriated as lodging rooms. HOSPITAL.

OKER, see OCHRE.

OLAETA (J. ORTIZ DE), see ORTIZ (J).

OLAMOSQUIN (JUAN BAUTISTA), also a sculptor, appears to have been the superintending architect in carrying out the design commenced 15th November 1564, by G. B. Castello, for the palace called el Viso, for don Alvaro Bazan, the first marquess of Sta. Cruz, in the town of that name. 66.

OLDFIELDIA AFRICANA, African oak, sometimes called African teak. It is an excellent wood for some particular purposes in ship-building, and is extensively imported for this purpose from Sierra Leone and the West Coast of Africa; but its great weight prevents its general application; a specimen of the best quality weighs 51 lb. 7 oz. per cubic foot; others 52 lb. 9 oz., and 54 lb. 5 oz.; ordinary about 50 lb.; and from the West Coast of Africa, as low as 43 lb. 11 oz. ARCHER, *Popular Economic Botany*, 8vo., Lond., 1853, p. 332. 71.

OLDHAM (.....), of Leicester, designed about 1775 Braunston Hall, about two miles from that town, for Clement Winstanley, esq.; THROSBY, *Select Views*, 4to., Leicester, 1789-90, i, 257.

OLDHAM'S system of warming and ventilating by means of air heated by steam, as adopted 1837-39 at the Bank of England, and 1823-39 at the Bank of Ireland, is described in CIVIL ENGINEER, etc. *Journal*, 1839, ii, 96.

OLDOVINO (JACOPO), served Filippo Maria Visconti as a military engineer; and designed the church and campanile of S. Antonio Abbate, at Cremona, destroyed in the eighteenth century. He lived 1441. 57.

OLEA, the Olive. It flourishes only in warm and comparatively dry parts of the world, as the south of France and Spain, in Egypt, Italy, Sicily, Syria, and the north of Africa. The species of the order best known in England are Olea Europæa, the Olive; Syringa vulgaris, the Lilac; Phillyrea, an evergreen of many forms; Ligrustum, the Privet; and Chionanthus, or the Fringe tree. 14.

Olea Europæa. The wood is fine and close grained, usually yellowish, but often beautifully feathered. It is much used in small ornamental work for furniture. MICHAUX, *North Amer. Sylva*, 8vo., Phil., 1818, ii, 166-204.

Elæagnus hortensis, *olivo di Boemia*, is used in Tuscany for furniture; its root is particularly striking in effect. 71.

Olea undulata, the black iron wood of the Cape of Good Hope. 71.

Olea apetala, iron wood, said to be the most durable of all the Norfolk island woods. 71.

Olea Americana, devil wood, of the Southern States of America: seldom more than 10 or 12 in. diam. When dry it is excessively hard and difficult to split. The wood changes to a rosy colour when exposed. MICHAUX, ii, 164.

The olive was described in the Paris exhibition of 1855, as "un arbre qui est une des essences dominantes de l'Algérie". Some of the planks and blocks were of enormous size, one of the latter would have been very large for an oak. The colour and grain of the wood, and of the root portion especially, were eminently beautiful, and render the wood invaluable for ornamental and cabinet work.

OLÉRON, see OLORON, in France.

OLGIATO (GIOVANNI MARIA), about 1560 was employed upon the cathedral at Milan. 27.

OLISIPO. The ancient name of LISBON in Portugal.

OLIVA (DIEGO MARTIN DE), designed with A. de Ribera before 1572 the chapter house at Seville. His other works will be noticed *s.v.* A. DE RIBERA, with whom and their fellow townsman B. Sanctus, he not only worked much in Jerez de la Frontara about 1575, but divided the post of maestro-mayor to its cathedral, a partition not often paralleled in the history of Spanish architecture. 66.

OLIVA (DIEGO DE LA), was appointed by the king, 13th June 1645, *maestro-mayor* of the works at the Alhambra at Granada, on the death of B. F. Lechuga, but there is no account of what buildings he designed there, or in the archbishopric. 66.

OLIVARES (MIGUEL DE), was a pupil *cir.* 1750 of don Torquato Cayon de la Vega; and designed *cir.* 1790 the changes to the façade of the cathedral at Cadiz as *maestro-mayor*, being overlooked by M. Machuca of Vargas. He was a member of the academy of S. Fernando. 66.

OLIVE. A tertiary colour produced by the mixture of (two secondaries of equal strength and proportion) purple and green harmonising with orange in the proportion of twenty-four olive to eight orange. REDGRAVE, *Manual of Colour*, 12mo., London, 1853. Invisible green, as it is called, is really an olive.

OLIVE, see OLEA. The olive was the emblem of peace and concord. Its leaf was introduced into sculpture by the ancients, in wreaths or garlands principally. "The Corinthian order is enriched with olive leaves, as are almost all the antiques at Rome, of this order; the acanthus being seldom employed but in the Composite"; CHAMBERS, *Decorative Part*, etc., fol., London, 1759. The oval beads carved on astragals, etc., are sometimes called olives. ACANTHUS. LEAFAGE. The representation of the olive tree in mosaic work by the Byzantine artists, is much commented upon by RUSKIN, *Stones of Venice*, 8vo., London, 1851-53, iii, 174-83. The corona oleagina, an honorary wreath made of olive leaves, was conferred by the Romans upon soldiers and their commanders, through whose instrumentality a triumph had been obtained, when they were not personally present in the action. It was the olive tree that Minerva is said to have caused to spring from the ground in the citadel at Athens, and is stated to have been preserved in the temple of Erechtheus.

At Baalbec, cramps and plugs are said to be of this wood; WOOD, *Baulbeck*, p. 23: as also the square dowels to the drums of the columns of the Parthenon; a portion of a circular one from the Propylæa at Athens, is in the collection of the Royal Institute of British Architects.

VITRUVIUS, B. i, c. 5, notices that "walls ought to be tied from front to rear with many pieces of charred olive wood, by which means the two faces will endure for ages. Olive wood is neither affected by weather, rot, nor age: buried in the earth, or immersed in water, olive wood lasts unimpaired; for this reason, walls and foundations tied together therewith are exceedingly lasting."

The olive is frequently represented upon early Christian tombs in the Roman catacombs. It is also introduced as an emblem of the Virgin, in the sculpture of the stalls in Amiens cathedral.

OLIVER (JOHN), master mason to king James I, was buried in the church of S. Faith, in S. Paul's cathedral. He

may probably have been a son of Isaac Oliver, the portrait painter.

OLIVER (John), perhaps a son of the above John, was one of the commissioners with R. Hooke, Mills, and E. Jerman, for regulating the rebuilding of London after the fire of 1666. Aubrey says he was surveyor to the city, and that he became possessed of a great part of the MS. designs and sketches of I. Jones (see Jones, p. 23). He was also assistant surveyor and purveyor at S. Paul's under Wren, having a salary of £100; the duties of which office are described in Builder *Journal*, 1858, xvi, 761. The date of his death is not known; but his portrait in crayons was the last done by W. Faithorne, who died 1691. Walpole, *Anecdotes*, *s.v.* Oliver and Faithorne.

OLIVETINES, see Benedictine order.

OLIVIA. A wood of Trinidad; see Bucida.

OLIVIER (.....), designed a country house near Noyon, for M. Vincents; and several houses in the park of the château de Bostoky, near Amiens, given in Krafft, *Arch. Civile*, fol., Paris, 1812, pl. 4, 6; 51-3; who in his *Jardins*, fol., Paris, 1810, ii, pl. 15, gives plan of a garden laid out 1790 for M. Moette, at Epernay in Champagne.

OLIVIERI (Pietro Paolo), born 1551, was the son of Antonio Olivieri of Rome, and also a sculptor. For pope Clement VIII (1592-1605) at Rome, he designed the ciborio of S. Giovanni Laterano; and made a model for the church of S. Andrea Apostolo della Valle, in the form of a Latin cross without ailes; it was commenced 1591; the plan is given in Rubeis, *Insignium Romæ Templorum*, fol., Rome, 1684, pl. 46. He was succeeded by F. Grimaldi; C. Maderno designed the choir, tribune, and cupola, and C. Rainaldi 1615 the façade; Rubeis, pl. 44, ascribes it to C. Maderno: the church was consecrated 1650. Olivieri died at Rome, 6th July 1599, aged 48 years, and was buried in the church of the Minerva, where a tablet was placed to his memory. Letarouilly, *Rome Moderne*, 4to., Paris, 1860, p. 486. 3. 5. 38. 111.

OLIVINE. A variety of chrysolite of a dark green, commonly called bottle green, in colour.

OLMO (Josef del), succeeded 3rd September 1677, on the death of G. de la Peña, as *maestro-mayor* of the royal palace, and the royal houses of the Pardo and of the Campo, at Madrid, but received no pay until the death in 1685 of F. de Herrara the younger, who had been also named *maestro-mayor* of the said works on 25th August 1677. The describer of the Escurial attributes the design of the altar-piece, and the chapel of Sta. Forma in the sacristy of that monastery, to him: but Palormino, who was then living, ascribes them to F. Rizi; they are in the style of Donoso, which does not suit the Escurial, or do credit to any one. Olmo died in 1702, and was succeeded by T. Ardemans. 66.

OLMO (Manuel del). By order of the council, arrangements were made by the city of Madrid for rebuilding the bridge of Toledo, across the Manzanares. A contract was made 8th August 1682, for 239,000 ducats de vellon, and the materials of the old bridge. The contractors received considerable advances of money, and 23rd August 1685 requiring further advances, the council ordered an examination to be made, when it appeared by the declaration of Manuel del Olmo and Miguel Martinez, that much less work had been executed than had been paid for. From the above date until 12th June 1690, the work being almost suspended, the contractors submitted complaints to the king, when M. del Olmo and Josef de Arroyo were appointed to measure all the works, as being the persons who knew most about the bridge and the discussions. The builders having refused to accept as arbitrators the *maestro-mayor* and Josef de Arroyo, and the council having admitted their rejection, on 10th November 1690, the junta of Madrid named in their places M. del Olmo, M. Garcia, and J. Gassen, to act in concert with those experts who might be named by the contractors, who were ultimately J. de Pineda, A. Carasa, and P. Gonzalez. Although these were in accord, with regard to measurements, yet through disagreement as to the time of the calculation, the two sets of assessors made separate reports. The results are given in full by Llaguno, iv, 187. The bridge appears to have been completed in 1735 (Madrid). 66.

OLMÜTZ (Latin, Olomucium or Eburum; Moravian, Holomauc). A city, formerly the capital of Moravia in Austria, situated on the rivers March or Morawa. It is very strongly fortified. Most of the houses, which are lofty, are built over piazzas. Two principal squares have many fountains by Raf. Donner, and a Trinity column, 114 Vienna ft. high, have fine statues by him; there is also the Swedes column 1543. The ancient bishopric, erected 1777 into an archbishopric, is one of the richest in Austria. The cathedral, dedicated to S. Wenceslaus of Bohemia, is partly Gothic and partly modern; king Wenceslaus III was buried 1306 in it. Under the presbytery is a crypt or roomy church, built 1130. There are twelve churches, among them is that of S. Maurice 1412, which has a beautiful tower, and the largest organ in Moravia; and of S. Michael with fine cupolas. A town house, detached, has a tower 246 or 250 ft. high; a university founded 1581, and re-established 1827, has between 600 and 700 students, the library, formerly a fine Jesuit seminary, has upwards of 50,000 volumes; the archbishop's palace, is an extensive building magnificently fitted up; the deanery; the arsenal and barracks; a hospital, which before 1784 was the magnificent college of the Jesuits; a theatre, several courts of law and public offices, and schools, comprise the other public edifices. J. W. Fischer, *Geschichte*, 8vo., Olmutz, 1808. 14. 26. 28. 50. 96.

OLORON, Oléron, and Olleron (ancient Iluro and Elorensium). The capital of an arrondissement in the department of Basses Pyrénées, in France. The lower town is situated chiefly between the Gave d'Aspe and the Gave d'Osson or Ossau, which at their junction form the Gave d'Oloron. The upper town is the oldest part and consists of a few lanes, the church of Ste. Croix of the eleventh century, and a little old market house. It was a bishopric from the sixth century, but suppressed in 1801. The former cathedral of Ste. Marie (Romanesque to Pointed) has a Romanesque portal of the twelfth century; this, and the episcopal palace are both reached by a lofty stone bridge over the Gave d'Aspe. 14. 28. 96.

OLOTZAGA (Juan de), a Biscayan, is considered to have introduced the German Gothic style into Spain, in his design about 1400 for the cathedral at Huesca in Aragon. The work met with various interruptions before the roofing was completed in 1515. In a kind of canopy over the principal entrance, consisting of a single stone, he caused to be finely carved his design for the church as a model for its completion. A doubt has arisen, however, whether the church was not commenced 1290-1300 in the time of bishop Adhemar, and this Olotzaga's work only. Street, *Gothic Arch.*, 8vo., Lond., 1865, considers the portal to date *cir.* 1350. The college at Valladolid, attributed to Olotzaga in Milizia, is by H. de Egas. 3. 65. 66.

OLY (Barnabas), see Grumbold (R.)

OLYMPIA. There was no distinct town of Olympia, but the temple and sacred grove of Zeus Olympius, was situated at a small distance west of Pisa, in Peloponnesus. Numerous buildings and countless (Pliny vaguely says more than 3000) statues once covered this sacred spot: Pausanias has devoted nearly two books, and one-fifth of his whole work, to the description of it: while Leake, *Peloponnesiaca*, 8vo., Lond., 1846, is a late attempt to elucidate the positions of about twenty-two great edifices, of which the only building at present found is the Olympieium, Olympium, or temple of Zeus Olympius; it was commenced B.C. 572, by Libon of Elis, but not completed for nearly a century, when Pheidias having finished the Parthenon went to, and remained at, Olympia for four or five years, from about B.C. 437-434 or 433. It was built of

native limestone called *poros* and covered with stucco in the more finished parts: the building was of the peripteral hexastyle example (6 columns in front with 13 on the return), and was the largest of the Doric order known in Greece Proper, being only surpassed in magnitude in the Peloponnesus by the later Ionic temple of Athene Alea, at Tegea, by Scopas. The length of the stylobate was 230 Greek feet, width 95 ft. and 68 ft. high to the apex of the pediment (Gell gives it as 231 ft. 8 ins. at the bases of the columns, and 95 ft. 8 ins. wide; the *cella* was 44 ft. wide): each column was fluted and 7 ft. 4 in. diam., or 6·70 ft. (Gell gives the angle columns as 7 ft. 1 in.) exceeding those of the Parthenon, which it resembled in the interior, the eastern division or cella containing the statue, and the western was the opisthodomus. The roof was covered with slabs of Pentelic marble, in the form of tiles, by Byzes. The subject in the eastern pediment was executed by Paeonius of Mende in Thrace; the celebrated chryselephantine statue of Jupiter Olympius, the work of Pheidias, has been the subject of many restorations; as by Quatremère de Quincy, *Le Jupiter Olympien*, fol., Paris, 1815: Lloyd, *Age of Pericles*, 8vo., London, 1875, ii, 255-68, describes it and other similar ones. The foundations were exposed 1826 to view by the excavations of the French commission, and many fragments of sculpture are in the Louvre. The German government in August 1875 commenced systematic excavations on the site, records of which are given in the Athenæum *Journal* since that date. These explorations are under the care of professor Curtius; some of the results have been recorded in the form of a portfolio of photographs of the fragments found, with descriptions. Pyrrhus and his two sons Hermo and Lakrates, three of the oldest recorded Greek architects, assisted at building a treasury at Olympia.

The temple was explored by Gell (*Itinerary of Greece*, 4to., London, 1810), and his measurements (as above) recorded in Wilkins, *Magna Græcia*, fol., Camb., 1807, App. 72, pl. iv, who states the proportions were nearly the same as those of the temple of Theseus at Athens. (Marquis Haus) *Saggio*, (temple) 8vo., Palermo, 1814. *Notice*, in Politi, *Lettera*, fol., 1819. Stanhope, *Olympia*, fol., Lond., 1824. Cockerell, in *Bibl. Italiana*, 1831, No. 191, p. 205. Forchhammer, *Remarques sur la Sculpture*, 8vo., Rome, 1832. Blouet, *Morée*, fol., Paris, 1831-39, i, pl. 56, etc. J. H. Krause, *Olympia*, 8vo., Vienna, 1838. Mure, *Journal in Greece*, 8vo., Edinb., 1842, ii, 280. Curtius, *Peloponnesos*, 8vo., Gotha, 1851, ii, 51. 2. 23.

OMBAH. A wood of the forests of Malabar, in the East Indies, and much esteemed. 71.

OMAYEH (Fatho ben Ibrahim el), see Ben Ibrahim.

OMBO, Kom Ombo, or Koum Ombos (the ancient *Ombos*. A village situated on the river Nile, above Edfoo, in Egypt. The ruins of a temple founded by Ptolemy Philometor, continued by his brother Physcon, and finished by Auletes (B.C. 173 to 60) has the peculiarity of two entrances and two parallel sanctuaries; one dedicated to light, the other to darkness. A stone gateway in a crude brick wall on the east side of one of the enclosures, bears the name of Thothmes III, showing that an earlier temple had existed. The smaller temple, in a very ruinous state, is a Mammesi, of the time of Ptolemy Physcon and Auletes. *Description de l'Egypte*, fol., Paris, 1820, i, pl. 39-40; text i, 216. 28.

OMBUESA (Pedro de), see Ambuesa (P.)

OMER, Saint (Lat. Audomaropolis), from Audomare or Omer, bishop of Thérouenne, in the ninth century. A town in the department of Pas-de-Calais in France, situated on the river Aa, in a marshy district, and ranks as a fortress. The bishop's see was removed from Thérouenne in the sixteenth century, and suppressed at the Revolution. The now parish church is dedicated to Nôtre Dame de Sithieu. It shows the transition from the Round to the Pointed style, but is chiefly of the 14th cent. It has very large transepts, and the arrangement of the chapels round the apse merits attention. A side view is given in the Magasin Pittoresque, viii, p. 313. The *dalles* (Intagliatura) supposed to date 1200-50, and now preserved in a side chapel on the south side, as also those of Blaringhem, have been published in the books named below; Deschamps also made a restoration, given in Didron, *Annales Archéologiques*; they are also described by Burges, *Incised Slabs*, in Builder *Journal*, 1855, xiii, 304, and cuts.

The tower 1431-1520 alone remains of the abbey church of S. Bertin, 14th and 15th centuries, at one time the noblest Gothic monument of French Flanders; it was ruined in 1794, while in 1830-31 it was further destroyed for building the new hôtel-de-ville, in which the stones were used. Blanchard, *Ruines*, etc., in two large lith. pl.; Devienne, *Diss. Hist.*, 12mo.; *La Vérité de l'histoire de l'église et—de S. Bertin; ou réfutation de la dissertation*, etc., 4to., Paris, 1754. Moyen Age Pittoresque, pl. 38; Wallet, *Descr.*, fol., Douai, 1834; France Catholique, 4to., Paris, 1843, i, 121, and view; Roger, *Bibliothèque Hist.*, etc., 8vo., Amiens, 1844, p. 177. There were formerly about twenty-five other religious buildings; but to be now noticed are the church of S. Sepulchre, 14th cent.; and that of S. Denis, nearly rebuilt of late years, but with a tower of the 13th century. A large military hospital, barracks, remarkable artillery barracks, a museum in the hôtel du Balliage, a lycée containing the public library of over 20,000 volumes, schools of art, and a theatre, are among the other public edifices. Wallet, *Descr. de la Cath.*, 4to., S. Omer, 1839. Deschamps, *Essai sur le pavage des Eglises*, 4to., Paris, 1842. Courtois, *Coup d'œil sur S. Omer à la fin du XVII siècle*, in *Mémoires* de la Société des Antiq. de la Morinée, vii. Piganiol de la Force, *Descr. de la France*, ii, 89 and 435. Hermand, *Hist. Sigillaire*, 1860; and *Hist. monétaire*, 1843. 14. 28. 50.

OMISSIONS. Works or provisions comprised within a contract, but which either wholly or in part have not been carried into execution or employed. When at the completion of a contract and the making-up of the accounts, the variations on the works are dealt with, those executed and not included in the contract are classed as "extras", and those which had been included and have not been executed are "omissions". In making his claim for "extras", the builder frequently neglects to appreciate the importance which the "omissions" may have, and not seldom he overlooks them altogether. But where the drawings and specification have been carefully prepared, and the contract has been based upon a proper bill of quantities, no difficulty exists in ascertaining the extent of the items of omitted works in respect of which the builder should give credit in the bill of variations: while on the other hand, where the contract has been made for a lump sum without quantities, great difficulty and much difference of opinion constantly arise as to the nature and extent of the omissions. In all cases "omissions" demand from the architect during the progress of the works, and from his surveyor at the settlement of the variations, a watchful care, not less continuous and exact than that given by the builder to the extras. A. C.

OM KEISS. A village in Syria; the ancient Gadara.

OMMERA. The native name for the indigenous cement used at Alexandria, in Egypt, with which the flat roofs are covered; it is composed of burned brick earth and stone lime, and with oil when the material is to be water tight, as in tanks, etc.

OMODEO (Giovanni Antonio), also written Amadeo, Homodeus or Homodeo, as in the register 1490 of Milan cathedral; also De Madeo, which is said to be on a fillet of the doorway between the *chiostro* della Fontana and the church; and Latuada, *Descr. di Milano*, 8vo., Milan, 1737-8, with some others, consider that he called himself Jean Henri Omodeo, as (as has been stated) in Giulini, *Memorie*, 4to., Milan, 1771, xi. 10. 40.

He is said to have been a native of Pavia; and to have

executed 1432 the beautiful bas-reliefs "sull' urna dei SS. Mario e Marta" in the church of S. Lorenzo, at Cremona; the *deposito* of Bart. Colleoni at Bergamo; and the tomb of Colleoni's daughter Medea, 1475 at Basella, a few miles from Bergamo, considered one of his best works, and having his name "Joannes de Amadeis" upon it: CICOGNARA, *Scultura*, fol., Venice, 1813-18, ii, 183, pl. 50; and MALASPINA, *Guida di Pavia*, 8vo., Pavia, 1819, p. 47; 116-8. His name occurs in connection with the certosa at Pavia, as working on the façade, begun 1473 under Ambrogio Fossano (MALASPINA, p. 114); or at the end of the 15th century directing the works on its façade (CICOGNARA); or 1487 with Crist. Rocchi (MALASPINA, *Cattedrale*, fol., Milan, 1816): and his name appears 13th April 1490, as one of the architects (ingegnere generale) of the cathedral at Milan (FRANCHETTI, *Storia*, 4to., Milan, 1821, p. 14-17). TORRE, *Ritratto de Milano*, 4to., Milan, 1674, states that at the parapet of the little loggia finishing the *chiocciola*, which leads to the cupola (tiburio, as explained, *s.v.* DOLCEBUONO) is a portrait surrounded by the inscription IO ANTONIVS HOMODEVS VENERE FABRICE MLI ARCHITECTVS, which is given as the frontispiece in FRANCHETTI, who p. 13-9, says it is not on a copper plate, as stated by TORRE and by CICOGNARA, i, 220. MILLIN, *Voyage*, 8vo., Paris, 1817, i, 28, says it is more probable that Omodeo built 1499 the certosa at Pavia, and so only designed the cupola at Milan, where he died 27th August 1522. "Omodei, father and son" are named *s.v.* Milan, and in the *Handbook*, as working at the cathedral. 10. 40.

OMPHALOBIUM LAMBERTI, zebra wood. A native wood of the Brazils, much used in cabinet work and in turning. AMBOINA.

ONDARZA (MARTIN DE). The corporation of the town of Renteria in Guipúzcoa not being satisfied with the plans made for the casa de ayuntamiento by Miguel de Aramburu, it was built by Joanes de Gayburg and M. de Ondarza, who were paid 3rd October 1607, 3040 reals, according to the valuation of P. de Zaldua of Asteasu, named on the part of the said artificers, and of M. de Leyzaola and N. de Garagarza, on behalf of the town. 66.

ONE PAIR. The short for "one pair of stairs", an expression signifying the first story above the story whose floor is level or nearly so with the ground.

ONGCOR THOM, see NAGA ARCHITECTURE; and FERGUSSON, *Indian Architecture*, 8vo., Lond., 1876.

ONOLZBACH, in Bavaria; see Anspach.

ONORATO (CRISTOVAL DE), see HONORATO (C. de).

ONSLOWE (FULKE), 1560 Dec.(?) petitioned queen Elizabeth for the offices of paymaster and clerk of the works in the household. CALENDARS, Domestic series, p. 165.

ONTANON, see GIL DE HONTAÑON.

ONYX (Gr. ὄνυξ, a finger nail, from the veins of that colour in it). When chalcedony occurs with opaque stripes or layers of black and white, dark red and white, in strong contrast to each other, it is termed onyx. The name onyx or onychites, has been also applied by the ancients to Oriental alabaster (Alabastrites), from the quarries of Caramania in Persia, and the mountains of Arabia. Though at first obtained of small size for cups and such like, it was afterwards found large enough for encrusting walls and making columns; a theatre was erected at Rome by L. Cornelius Balbus, B.C. 13, which was remarkable as containing four pillars of onyx. Both onyx and sardonyx have been employed by ancient and modern artists for executing those gems in relief called *camei*. The most valuable stones are from India, but they are now imported from Germany of artificial manufacture. WESTROPP, *Travellers' Art Companion*, 8vo., Lond., 1868. 6. 13.

The "Algerian onyx marble" from Oran, was discovered 1849 by Delmonte; the locality had doubtless furnished the material to the Romans: it was not brought to France in any large quantities until after the formation of the Compagnie des marbres onyx de l'Algérie, in 1858. Pure white, brilliant red, golden yellow, and hues of green, with every variety of striation and flocculence exist. The cost of a small staircase of this marble in a house in the Champs Elysées was 200,000 fr. (£8,000), but the effect is thought to be scarcely proportionate to the cost. The translucidity, general beauty, variety and ornamental adaptability in decoration as balusters, pedestals, chimney pieces, etc., and numerous articles for the table and shelf, were set forth in the Exhibition of 1862. This material was largely used in the magnificent staircase of the grand opera house at Paris. The Paris Exhibition of 1867 displayed the Algerian so-called onyx in every variety and form; and from Russia, or its Caucasian region rather, comes a rival to it, in a fine example, but the distance will prevent its being much used: BUILDING NEWS *Journal*, 1867, xiv, 489-90.

To a "Mexican onyx marble" was awarded a gold medal at the Maritime Exhibition, Paris 1875. It is considered to far surpass in purity, colour, surface, and dimensions, any analogous production. Every colour may be found in it: green in all its gradations; white and greys of all tints; red, pink, black, violet, brilliant yellow, and blue. Its formation is carbonate of lime, combined with sulphate of copper, silver, mercury and gold (and stearite, French?); its density surpasses all known marbles; the weight of a cubic metre (=35·316581 cubic feet English) being 8,000 lbs. It can be cut as thin as glass and is nearly as transparent. Blocks of almost any dimensions can be supplied. It is said to take a polish equal to that of the finest stones, lasting for many years. The unpleasant dark veins in this marble interfere with its beauty.

OODEYPORE, Odeypoor, Oodipoor, Oudeypore, now written UDAIPUR, in Mewar, in Hindostan.

OOJEIN (Sanscrit, *Ujjayini* and *Avanti*). A town in the province of Malwah, in Western Hindostan, six miles in circumference, and surrounded by a stone wall with round towers. It is of great antiquity and was the seat of government until that was transferred to Gualior. The principal buildings are the spacious bazaar, which is paved with granite; the pagodas near the palace on a lake, more especially the temple of Maha Cali, and those of Krishna and Rama at Unkpal; the ghauts pavilions, Hindoo temples, tombs, and fine choultries, temple to Mahadeva adjoining the tomb of Scindia's wives; Mhadajee Scindia's palace, about 1820, four stories high and very imposing; and near it are the remains of a gateway called Chowbees Derwazeh, or twenty-four doors, reputed to be nearly coeval with the time of Vicramaditya *cir.* 660. The wooden fronts of many of the chief buildings are elaborately carved, and the roofs tiled. The observatory built by raja Jeysing is on the north-west of the town, but was long since consigned to neglect: it was not one of his best. About one mile north of the present town, stood the ancient city, which with 80 other large towns in Malwah and Bagur were, according to tradition, buried "by a shower of earth", about half a century before the Christian era—Oojein being at that time the seat of empire, of art, and of learning. On digging on the spot indicated, to a depth of 15 or 18 ft., brick walls, pillars, timber, utensils, and coins have been discovered. FORBES, *Oriental Memoirs*, 4to., Lond., 1813, iv, 5-7; who also describes the curious "water palace" at Calloa deh, Kalleadeh, or Caliadeh, about five miles distant. 14. 50.

OOLITE, or Roe-stone. The characteristic rock of one of the great systems of secondary strata of geologists. The resemblance of the grains forming the mass to small ova, or the roe of fish, has given origin to the English term, and to the Ger. *rogenstein*. At one time it was supposed that these round masses were portions of limestone which had gathered round various forms of minute fossil animals: but recent investigations have shown that they are formed in the same manner as the larger nodules of the magnesian limestone. The oolitic range is one of great extent in England, and the composition varies very much. The oolitic deposits are divided naturally in England into three; the upper oolite

resting on the Kimmeridge clay, the middle oolite representing the Oxford clay covered by the coral rag, and the lower oolite, composed of numerous bands of clay, sand, and limestone. The system embraces the formation called LIAS.

One of the purest examples of oolite is the fine yellow freestone of Ketton, in Northamptonshire, which is wholly composed of round grains of concretionary structure *adherent* by their contiguous surfaces, so as to form a stone easily wrought with the chisel, and of durable quality. The Bath freestone is another example, where the grains (often hollow) are *connected* by interposed calcareous matter; the Portland stone resembles the former, but contains disseminated or aggregated silex. Much of the Lincolnshire freestone is oolite, of which the round grains are firmly compacted in a general basis of crystallized carbonate of lime. Limestones possessing the oolite character occur in different parts of the series of strata, but nowhere very abundantly, except between the lias and the green sands. Specimens may be found in the mountain limestone at Clifton, Kirkby Lonsdale, etc., and in the magnesian limestone of Yorkshire and Derbyshire.

Such stones will of necessity suffer unequal decomposition, unless the oviform bodies and the cement be equally coherent and of the same chemical composition. The limestones usually termed *shelly* or *shelly oolite* from being formed of either broken or perfect fossil shells cemented by calcareous matter, suffer decomposition in an unequal manner, in consequence of the shells, which being for the most part crystalline, offer the greatest amount of resistance to the decomposing effects of the atmosphere. The names of the chief quarries supplying oolitic stones, are Ancaster, Barnack mill, Bath, Cranmore (near Doulting), Haydor, Ketton, the isle of Portland, Taynton, Wass, and Windrush, which names, with others, can be referred to in this work. Of buildings erected of this stone, Byland abbey, of the twelfth century, especially the west front, built of stone from its vicinity, is in almost a perfect state of preservation. Newark and Grantham churches, and other edifices in Lincolnshire, of stone similar to Ancaster stone, have scarcely yielded to atmospheric influences; and Windrush church is in excellent condition. The abbey church at Bath, and those at Gloucester are much decomposed. The well-selected stones in the edifices at Stamford, Ketton, Colley Weston, Kettering, and other adjoining places attest the durability of the shelly oolite called Barnack rag. Glastonbury abbey, of stone like that at Doulting, is well preserved, whilst parts of Wells cathedral are decomposed, where it has not been well selected. Ham Hill stone, used at Montacute house and in other places, is in excellent condition. Chilmark stone, a siliciferous limestone, is used at Salisbury cathedral, where "the excellent condition of the building generally is most striking". The shelly oolite at Oxford, similar to Taynton, is generally in a good state of preservation, whilst the calcareous stone from Headington, greatly used in the same city, is in a deplorable state of decay. The stones which look the most compact are often least so, and *vice versâ*—the rough disintegrated looking Ketton stone for instance, as contrasted with the smooth solid looking Farleigh Down Bath stone. BATH STONE; CAEN STONE; PORTLAND STONE; and other articles.

TABLE OF THE CHEMICAL ANALYSIS OF OOLITES.

NAME.	Ancaster.	Bath Box.	Portland	Ketton.
Silica . . .	0·0 ...	0·0 ...	1·2 ...	0·0
Carbonate of lime.	93·59 ...	94 52 . .	95·16 ...	92 17
Ditto of magnesia.	2·9 ...	2·5 ...	1·2 . .	4·1
Iron alumina .	0·8 . .	1·2 ...	0·5 ...	0·9
Water and loss .	2·71 ...	1·78 ...	1·94 ...	2·83
Bitumen . .	Trace ...	Trace ...	Trace ...	Trace
Cohesive powers .	33 ...	21 ...	30 ...	36

Report on Stone for building the New Houses of Parliament, fol., Lond., 1839; and 1845. *Building Stones of the Oolites*, in BUILDER *Journal*, 1851, ix, 716. ANSTED, *Elementary Geology*. PENNY CYCLOPÆDIA, Suppl. 1858. 1. 14.

Oolite, a carbonate of lime, is found in Ireland only in the counties of Antrim and Derry; but it does not occur to any extent in that country. Being easily worked, it is most useful for decorative purposes, and hardens by exposure to the weather; it is divided into different groups, among which the argillaceous laminated stone, called lias, is found, which from its fine grained texture is much used by lithographers. WILKINSON, *Practical Geology*, 8vo., London, 1845; p. 23.

OORT (ADAM VAN), of Antwerp, born 1557, died 1641, was very celebrated in the three arts; he was a pupil of his father Lambert Oort. 5.

OPA or OPE (Gr. ὀπή; Rom. *columbarium*). In Grecian architecture, the space or interval in the wall occupied by the end of a beam of a floor or roof, as in a temple; the space between the *opæ* was called *metopa*, and the end of the beam formed the triglyph. HOPE. METOPE. 25.

OPAION. The Greek word for the lacunaria or ceiling panels formed by beams crossing each other at right angles. WILKINS, *Prolusiones*, 4to., Lond., 1837, p. 91. 25.

OPAL. A precious stone of bluish milky colour, but at certain angles of light displaying brilliant and varied colours, well described by PLINY, who states that India only supplied it, and that some of inferior quality came from Egypt and Arabia, and from Pontus, but still more inferior. The finest opals now come from Hungary. "The noble opal was too highly esteemed by the ancients as a precious stone to find its way into the hands of the engraver", WESTROPP, *Traveller's Art Companion*, 8vo., Lond., 1868. 6.

OPAL or milk white glass, used for globes for lamps, letters, etc., was exhibited by Messrs. Chance in the Exhibition of Industry, 1862, held in London.

OPAQUENESS of window glass, is said to be caused by the potash or soda contained in it combining with the carbonic acid of the atmosphere. This whitish appearance is removable by first rubbing it with dilute hydrochloric acid, and next cleaned off with moistened whiting. The opaqueness of the original glass in King's College chapel, at Cambridge, due to three centuries of smoke and dirt, being such as to obscure many parts of the stories depicted, it was in 1847 decided to clean the glass, and to reload it. A cartoon was traced of the leads, which were then cut away, the pieces of glass steeped a few hours in soap lees, then washed in soap and water, and put together again with new leads and bands and refixed. About ten of the windows were so treated under the care of W. J. Bolton, esq.; but though most persons were satisfied with the result obtained, the remainder of the windows were left untouched.

OPENING. That part of the walls of a building, which is unfilled, for admitting light, for air, for ingress, egress, etc. APERTURE.

OPEN SPACE. The Public Health Act 1875 (sec. 157), gives power to every urban authority to make bye-laws—"with respect to the sufficiency of the space about buildings to secure a free circulation of air, etc." Such authorities accordingly usually contain a provision that there shall be an open space of a certain area attached to and devoted to the separate use of every domestic building in the rear, or on the side, of the same. In Manchester, under the local act, the area required is only 70 square feet; but 150 feet is the more usual. It is also customary to fix the least width of such open area according to the height of the buildings adjoining, from 10 feet in the case of buildings of one storey to 20 feet and upwards in the case of buildings of three and more stories. In London, however, it is provided by the Metropolitan Buildings Act 1855, sec. 29, that "every building used or intended to be used as a dwelling house, unless all the rooms can be lighted and ventilated from a street or alley adjoining, shall have in the rear or on the side thereof an open space exclusively belonging thereto of the extent at least of 100 square feet." Although the *intention* of this clause is

tolerably clear, it is so carelessly worded, that there is much difference of opinion as to the exact meaning, and this important provision, in a sanitary point of view, is sometimes practically evaded. The Act does not contain any provision that the dwelling house shall be lighted or ventilated from the open space provided. It has been held by the magistrates, in cases that have been brought before them under the Act referred to, that where the ground floor of a dwelling house consists of one room, as in a shop, the provision as to the open space does not apply as regards the ground floor, but in that case the space must be provided at the level of the first floor. It has also been decided that the provision does not apply to open spaces existing in the rear of dwelling houses erected before the passing of the Act, which may therefore be built over. LIGHT AND AIR. C. F.

OPEN WEB GIRDER or BEAM. A girder of cast iron, having open spaces in its height; or formed of wrought iron plates and ribs, with oblique braces. An open iron beam is given in TURNBULL, *Essays*, 1832. The result of testing two cast iron open girders, 40 ft. span, which failed under the trial, is given in WEALE, *Dict. of Terms*, 8vo., Lond., 1849-50, p. 205. The open webbed girders to carry the Victor Emmanuel railway over the river Isere, near Montmeillant, in Savoy, designed by E. Clarke, consist of four openings, each 130 ft. 4 in. in span; the two girders were each 557 ft. 8 in. long, with a depth of 12 ft. and a width between the two of 14 ft. 9 in. One hundred and forty-three girders placed across, and 3 ft. 8 in. apart, carries the platform for the rails: BUILDING NEWS *Journal*, 1857, iii, 790. BOW, *On Openwork Girders*, in CIVIL ENGINEER, etc. *Journal*, 1855, xviii, 300. *The Economic Angles in Parallel Openwork Girders*, in the same publication, 1862, xxv, 67, 97, 147-151, by R. H. B.

OPERA HOUSE, see THEATRE.

OPERARIUS. In the CAMDEN SOCIETY, *Fabric Rolls of York Minster*, 8vo., Durham, 1859, p. 6, the word "operarius" is used, probably meaning a workman regularly employed and attached to the fabric, while "operans" is used for a person casually employed. In the Campo Santo at Pisa, 1200-78-83, is the inscription, "Tempore Domini Federici Archi-episcopi Pisani, et Domini A.D. MCCLXXVIII. Terllati Potestatis—Operario Orlando Sardella, Johanne Magistro edificante"; this "Johanne" being Giovanni Pisano; as given in ROHAULT DE FLEURY, *Les Mons. de Pise*, 8vo., Paris, 1866, p. 103: in CICOGNARA, *Scultura*, fol., Venice, 1813-18, i, 193, it is somewhat different.

OPERATIVE. An artisan or workman.

OPERATOR. A Latin designation, which occurs *cir.* 1063 at Pisa, in the epitaph to Busketus, "prudens operator et ipse magister", etc., CRESY and TAYLOR, *Pisa*, p. 5.

OPHEM (MARTIN VAN), is named in 1517 as succeeding Henri van Pede at the chapel of the S. Sacrement in the church of S. Gudule at Bruxelles, perhaps until 1542, when Michel Boots is named. MESSAGER *des Sciences de Belgique*, 8vo., Gand, 1841, p. 239.

OPHITES, see SERPENTINE.

OPISTHODOMUS. The Greek name for the *posticum* of the Romans in the arrangement of the temple: and later was used for the enclosed space or hall in the rear of the *naos* of a temple. In the Parthenon, that temple being placed facing the east (not the west; ORIENTATION), the smaller division of the *cella*, called opisthodomus, is at the west end. In it the money proceeding from the revenues, etc., was placed; the names of the debtors to the state were inscribed; private sums of money were deposited; also offerings to the goddess; and spoils taken from the enemy. The temple of Zeus Olympius, at Olympia, was arranged in a similar manner, and behind the opisthodomus was the Callistephanus or wild olive tree, which furnished the garlands for the Olympic victors. 1. 2. 6. 25.

OPLE TREE. The wych hazel is so called in the north of Great Britain.

OPORTO or O PORTO, the port (or *Portus Cale*, hence Portugal). A large seaport in the province of Douro in Portugal, and the capital of that country until 1174, when the seat of government was transferred to Lisbon. It is built in terraces. A suspension bridge (built since 1832) over the river Douro leads to the Villa Nova de Gaya, and to the celebrated convent and garden of Mosteiro del Serra, founded 1540, for Augustinian monks; its circular church is said to have been built in imitation of that of Sta. Maria Rotondo at Rome; and on to Lisbon. A quay extends the whole distance of the town; and at the east end along the banks are the immense vaults or *lodges* where wine is kept until it is stored. The British factory house, *cir.* 1820, of white granite is handsome, and contains a good library, reading room, and ball room. There are eleven public squares called *campos*, three large monasteries, and three hospitals. In 1850 the immense building called the *seminario* do Prado do Bispo was destroyed in order to use the materials in other town buildings.

The cathedral, under the invocation of the Assumption of the Virgin, dating from about 1100, has been modernised; the cloisters and original parts of it are of the thirteenth century or earlier. It is a cruciform church with eastern chapels to the transepts, two western towers, a central tower, and a south cloister. The Cedofeita church claims to be the oldest in Portugal, being said to have been constructed by king Theodimir in 559; it has been modernised, but some very early Romanesque capitals exist of a later date. San Francisco, 1258-80, is a parallel triapsidal church, with a choir gallery occupying the two western bays of the nave. The whole is encrusted with *talha* or gilt wood, put up in the eighteenth century. RACZYNSKI gives the date of 1325 to the church; and CARDOSO states the Franciscans were transferred to this place in 1404. One of the most striking architectural features is the *Torre dos Clerigos*, (the highest steeple in Portugal after those at Mafra) erected 1748, and attached to the church of the same name; the churches of dos Congregados, de Ildefonso, and de S. Carmo, are mentioned by some writers out of some 90 in number. The episcopal palace, *cir.* 1545-90 was by J. de Juni. The town suffered in the wars of 1805-9, and 1831-2 when much of it was destroyed. Map, No. 195, of the Society for the Diffusion of Useful Knowledge. BATTY, *Select Views*, 4to., Lond., 1832, 6 plates. ECCLESIOLOGIST *Journal*, 1854, xv, 42. 14. 50. 66. 96.

OPPENHEIM. A town in Hesse Darmstadt, situated on the river Rhine. In it is a ruined castle, four hospitals, a synagogue, and three churches, of which the one dedicated to S. Katharine is of great interest. The two western towers and entrance are of the 12th century; the nave, the vaulting of which up to the chancel has fallen in, and the choir (now roofless) being five sides of an octagon, were commenced 1262 by Richard, king of the Romans, brother of king Henry III of England, and completed *cir.* 1317, is of a more advanced character than the English buildings of that date; the nave of York cathedral dating after 1320. W. von Koldenbach was *meister* from 1280. The walls are of wrought stone only 18 in. thick, filled in with richly ornamented windows of flowing tracery, and supported by rich and deep buttresses, with crocketing, etc.; the two circular traceries, each 15 Rhineland feet diameter, formed in two of the windows, are the finest of their sort. The entrance is now at the transepts. Beyond the towers is a western choir terminating in three sides of an octagon, which served for the canons, and was consecrated 1439; the vaulting has also fallen in. Much damage was caused to the building in the wars of Louis XIV. It is under restoration. The total length inside is 268 ft., of which the western chancel is 92 ft. and 46 ft. wide and without ailes. The nave is 102 ft. long and 86 ft. broad, including the ailes, which have chapels beyond. MUELLER, *Die S Kath. kirche zu Opp.*, elep. fol., Leipzig, 1830, text 4to., 43 pl., including 10 of coloured glass: Enlarged edit., 1853.

King, *Study Book*, fol., Lond., 1858-68, ii, 2 plates. Moller, *Denkmahler*, fol., Darms., 1821, pl. 31-7. Kugler, *Geschichte der Baukunst*, 8vo., Stuttgart, 1859, iii, 282-6; Kallenbach, *Die Baukunst*, fol., Munich, 1847, pl. 46. "The tracery of the windows and walls of the side ailes shows how ingeniously it was possible to misapply even the beautiful details of the early part of the fourteenth century"; Fergusson, *History of Arch.*, 8vo., Lond., 1867, i, 633. The ruins of the castle Landscron, restored 1416, and the Swedish pillar, erected 1631 by Gustavus Adolphus to commemorate his passage of the Rhine, are worth notice. 1. 14. 28. 50.

OPPENORDT or Oppen Oordt (Gilles Marie), also Openort, Oppenord, Oppenort, and Opdenoord, was born at Paris, 27th July 1672. He was a son of Alexandre Johan (or Cander-Johan in Lance) Oppen Oordt, *ébéniste* to the king, (died 16th April 1715, aged above 76 years, and was buried in the church of S. Germain l'Auxerrois), and after having been a pupil of J. H. Mansart, he went 1692 to Rome as *pensionnaire du roi;* remained there and in Lombardy, drawing the ancient edifices, and on his return in 1700, made his *début* by erecting the tomb of the marquise de Leuville, in the church of the noviciate-general of the Reformed Dominicans. In 1704 he built the high altar (no longer existing) in the church of S. Sulpice, and the baldaquin of S. Germain des Prés, the cipollino columns of which are now in the Louvre. About the same time the regent duke of Orleans, to whom Oppenordt had been appointed chief architect a little before 1715, and director of manufactures, and about 1720 intendant-general of his buildings and gardens, confided to him the direction of the fête given to the king at Villers-Cotterêts, November 1722; and 1720-21 the decoration of the entrance saloon to the great gallery (galérie d'Enée) built by J. H. Mansart at the palais royal, for Louis XIV after 1692 (Blondel, A. F., iii, 40-43 and plates): these buildings, stretching as far as the rue Richelieu, were destroyed when the salle du théâtre Français was built by V. Louis. At S. Benoit, in 1706, he erected the tomb for the wife of the librarian, F. Leonard. In 1710 he built from his own designs, the chapel of S. Jean Baptiste in Amiens cathedral. During 1719-36 he was employed to continue the works at S. Sulpice, and to him is owing the second order of the northern portail, and the southern façade of this church; with the interior decoration of the side portails, "en carton", some of which were destroyed before 1808: Blondel, *Arch. Franç.*, fol., Paris, 1752-6, ii, 39-41, and plates. Blondel, *Cours*, 8vo., Paris, 1772, iii, 330-52.

Among his other works were the little château de Montmorency, and its orangery, for Pierre Croizat (the château by S. Cartaud): 1720-21, the modernisation of the interior of the hôtel of the grand prior of France in the Temple; the decoration of the choir and altar of S. Victor: two tombs of bronze with bas-reliefs, in the chapel of the Virgin in the Carmes-Déchaussées de la rue de Vaugirard: and the enlargement of the hôtel of P. Croizat, in the rue Richelieu, where Oppenordt was himself conveniently lodged. He died at Paris in 1742, aged 70 years (Milizia says 1733; Blondel, *Cours*, and Virloys, *cir.* 1730). He is also said to have embellished the hôtel de Toulouse, place des Victoires, for M. de S. Albin, archévêque de Cambrai, originally belonging to F. de l'hópital du Halier, marshal of France. Oppenordt introduced about 1715 the style *rocaille*, he was in fact called the "père du genre rocaille"; it lasted until 1745. Quatremère and D'Argenville style him "le Borromini Français". Lance, *Dict. Biog. des Arch. Franç.*, 8vo., Paris, 1872. Brice, *Descr. de Paris*, 12mo., Paris, 1725, i, 240; ii, 74; iii, 265, 286.

He published *Dessins, Couronnements et Amortissements convenables pour dessins de portes, voussoirs, croisées, niches*, etc., fol., Paris, 1740. He left a collection, engraved after his death, being *Son Œuvre, contenant différens fragments d'Architecture*, etc., fol., Paris (1750), in 120 plates. Milizia states that upwards of 2000 of his designs were in the possession of J. G. Huquière, who engraved and published *Premier Livre de differents Morceaux à l'usage de tous ceux qui s'appliquent aux Beaux Arts*, 6 pl., 4to., Paris, n.d. And there are also to be found *Livre de Fragmens d'Architecture*, 4to., Paris, n.d.; and *Livre contenant* 12 *cartouches propres aux édifices*, etc., fol., n.p., n.d. One hundred and nine of his compositions are in the royal collection at Stockholm. 3. 5. 25. 34.

OPTICAL CORRECTION and refinement; also effect and illusion. That alteration of a line, detail, or a proportion drawn or set out according to rule, which is necessary to make each of them appear correct when seen from a proper distance. Several subjects under these heads are considered in this work, *s.v.* Æsthetics, Attitude, Dentil (*Illustrations*), Diminution of a column, Entasis, Flute, Gutta band and Guttæ, Hog-backed, Inclination of the axis of a column, Inclination of the face of a wall, Monochrome, and Scamilli impares: while others will be noticed in this article.

In architecture it is a great question, if a designer be at liberty to modify the proportions of objects to remedy the errors of sight, in order to correct the apparent alteration which distance and the situation of objects produce in their form, or whether he ought to leave to optical effects all the illusions which nature produces, and trust to the judgment of the eye to rectify them, or if, in fact, art ought to meet, correct, or exaggerate them. This question has been considered by most architects who have written upon the art, and they are divided in opinion; Quatremère de Quincy, *Dict., s.v.*, Changement, who gives the words of Vitruvius and of Perrault upon this subject. "The effect produced on the spectator, who enters S. Peter's at Rome for the first time, will be that of an ordinary church, it appearing much less than it is, from the change of form altering its proportions. The effect of just proportion is to make an edifice appear larger than it is, as is the case in the Sforza chapel in Sta. Maria Maggiore at Rome; of the Medici in S. Lorenzo at Florence; the library in the same church; and the temple of the Madonna degli Angeli, near Assisi, as reduced": Milizia, *Lives*, *s.v.* C. Maderno. "The apparent smallness of S. Peter's at Rome when first seen, has been sometimes strangely attributed to the excellence of its proportions (as explained by Montesquieu, *Essai sur le Goût*). The true reason is probably the excessive size of all the details, not merely in the architecture, where increase in the dimensions of the constituent parts (as, for example, the arches of the nave) necessarily involves diminution in their number, but also in the sculpture—the statues near the eye are thirteen feet high—the cherubs supporting the holy water basins, although infantile in form, are nearly six feet in height; nor are there any other statues visible in the nave on entrance by which the eye can rectify its error—and these are accepted by the eye as a scale for measuring the building in the ordinary way"; Oldfield, *S. Peter's and S. Paul's*, 8vo., London, 1876, p. 46. The cathedral of Florence, also, whose few and great arches give an effect worse than S. Peter's, might be contrasted with the numerous small arches, etc., of a Gothic cathedral (T. H. L.)

The effects of vision produced by distance, were known to some only of the sculptors and architects of Greece, and not apprehended by the general body of the people. This was proved in the well-known contest between Phidias and Alcamenes to produce a statue, which was to be placed in an elevated position. The work of the former, when it was beheld on the ground, had nearly caused him to be stoned, on account of the extravagant expression he had given to it; which, however, became softened when the statue was lifted up to its proper position; whilst that of the latter had great delicacy of execution, which became totally lost and therefore disregarded at its full height. The same result was probably obtained by the head of Diana, set up on high at Chios, which

while it showed the science of the artist, showed also the want of a scientific perception in others, for the goddess was made to look severe on those who came into the temple, but mild on those who left; that is, the figure appeared rougher as it was approached, but more softened as the spectator moved to a greater distance; an effect considered by the people as a kind of prodigy, showing that they were not familiar with the laws of vision; Bromley, *History of the Fine Arts*, 4to., London, 1793-5, i, 386-90. Belzoni remarks that the heads of colossal Egyptian statues are proportionally larger than the lower members, which has been designedly done, in order that the due proportion of parts might be preserved to the eye. The entire colossal statue in the British Museum is, however, an exception to such a rule. To give effect to such figures, both standing and sitting, the Egyptians placed smaller figures beside them, which themselves are larger than life. The same thing was done by the sculptors of India; Egyptian Antiquities, 8vo., Lond., 1832, i, 294. Viollet-le-duc, *Dict., s.v.* Sculpture, p. 157-62, remarks on the alteration of the limbs of statues in regard of altitude.

A striking instance of the importance and necessity of the optical corrections applied by the Greeks to the horizontal and vertical lines of their architecture, is afforded by the National Academy erected (1875) in Athens from the designs of Messrs. Hansen and Ziller. The façade of this building is designed on the basis of the purest examples of ancient Greek architecture, and is executed in white marble of the finest quality. Design, material, and execution, are alike of the highest quality, but the horizontal lines being all truly level, and the vertical truly so, and optical corrections having been entirely neglected, there are apparent distortions in both directions, which the brilliant sun of Athens causes to become strikingly evident. (A. C.)

It might be a study of interest and advantage to perceive how, in the Parthenon, as in other consummate productions of human art, a gradual development of its merits has taken place. Thus three refinements in its structural composition, of which Stuart had no notion, have been discovered. The *entasis* was first observed 1814 by Thomas Allason, afterwards confirmed by C. R. Cockerell and Haller; the slope or inclination inwards of the axis of the columns, 1829 by T. L. Donaldson, although this has been claimed subsequently by the French for Fuente, a pupil of Duban; and the convex curves of the stylobate and of the entablature, by John Pennethorne, who mentioned it privately in 1837, but was forestalled, as to publication, by Hoffer, in Förster, *Allg. Bauzeitung*, fol., Vienna, 1838, p. 249; 371, etc.; pl. 237-9: and 1854, p. 114, pl. 615. It has been stated that the face of the entablature forms a concave line on each side of the edifice, so that the angles are slightly acute, but this is said not to be correct by Penrose, who has carefully ascertained and noted the corrections in this temple.

The columns at the angles of Greek temples, as in the Parthenon and the temple at Ægina, because situated more in the open air, were placed closer, and also made about a fiftieth larger than the others; Vitruvius, iii, 3; vi, 2. At Segesta they are 6 ft. 8·4 in. diam., the others 6 ft. 6·9 in., the excess being $\frac{1}{50}$. In the great temple at Pæstum they are 7 ft. 0·23, the others 6 ft. 10·35, being $\frac{1}{48}$: in the Theseium the excess is $\frac{1}{50}$, in the Parthenon $\frac{1}{54}$; Leake, *Peloponnesiaca*, 8vo., London, 1846, p. 126; 129. When the portico had two rows of columns, the inner row was smaller than the outer, and they appear to converge to a central point of view, giving the appearance of its being deeper than it is really. In fluted columns the smaller ones had a greater number of flutings than the larger ones; Bromley. The flutes of the outer row of columns in the Parthenon, made to appear deeper by effect, are not cut in segments of a circle, but are made flat at bottom, so that the sides rising abruptly, cause a deeper shadow; the flutes of the inner row are segmental; Gailhabaud, *Monumens*. The flutes to the arch of Hadrian and to the monument of Lysicrates are somewhat more than a semicircle: those to Jupiter Tonans at Rome are somewhat oval, and recessed behind the broad fillet; Taylor and Cresy.

Vitruvius, B. iii, chap. 3, at the end of his Ionic Order, directs that the faces of the members above the capital should lean *forward* one-twelfth of their height. Scoles, Paper read at Inst. of Brit. Archts., 23rd February 1846 (Builder *Journal*, iv, 127), stated, however, that his measurements of the Parthenon proved that the face of the corona inclined as directed, but those of the frieze and architrave receded, the former ·750 in 3.8.1 (Stuart, ii); and in the Theseium only ·2 in 2.2.116 (Stuart, iii). The face of the *triglyph* is vertical; in later times it was made to slope to the architrave Gailhabaud, *Mons.* In the Doric order of the theatre of Marcellus at Rome, the guttæ in the soffit over the triglyphs are sloped gradually to the outside, instead of being equal in size; thus making them look all alike. The order itself is made with hardly any diminution, to counteract the effect of the usual diminution at the height at which the order is placed: Bromley, ii, 143-5. At Priene and Jackly, the faces of the dentils are made to incline; Penrose, p. 36. In the arch of Hadrian at Athens, the two faces of the coffers slope inwards, allowing the lower edge of the upper one to project before that of the lower one; Stuart, *Athens*, etc., iii. Every part of the monument of Thrasyllus slopes backwards; Mauch. The moldings of the Propylæum at Athens, are described by Hoffer, in the Allg. Bauzeitung, 1841, p. 91, pl. 390-6; and 1854, p. 98, pl. 614. The ground of incised hieroglyphs is usually parallel with the face of the work; but generally throughout the temple erected by Rameses III at Medeenet Haboo, the surface of the hieroglyphs was made in a plane so inclined to that of the wall, as to give the greatest depth at the foot of them; as noticed *s.v.* Letter, in this work.

To counteract the effects of vision, the ancient artists omitted the upright parts of cornices elevated at a great height, because those parts are not distinctly visible to the eye at such heights; and they are made less visible, because while the projecting parts gain in bulk by their height, the upright parts must lose: Bromley, i, 389. "Where the parts are far removed from the eye, or where, from the extraordinary size of the structure, it has not been practicable to give to every member its due projection, recourse has been had to artifice, in order to produce the desired effect. At S. Peter's of the Vatican this practice is very frequent; and I have given (on pl. 11, fig. 1) a section of the cornice terminating the pendentives of the dome, which may serve as a guide, in cases where the like is necessary;" Chambers, *Decorative Part*, etc.

The extraordinary projection of the entablature of the frontispiece of Nero, or temple of the Sun (Desgodetz, Palladio, and Serlio) making the columns look weak and over-weighted, was met by employing the pycnostyle intercolumnation: Bromley, ii, 73.

At Cora, in the temple to Hercules, the *underside* of everything is cut upwards; Nicholson, *Principles*, pl. 207. In the moldings of the entablature to the octastyle vestibule to what is called the Greek theatre or theatre of Hercules at Pompeii, an artifice has been employed by the architect, to produce an effect as if black lines had been painted: this is done by cutting deep narrow lines under the projecting moldings, allowing of no reflection, and consequently producing a sharp and black shadow; this is in some degree the office of the quirk; and is a parallel to the practice adopted by Sir F. Chantrey, of putting either a pencilled or an incised line under the eyelids of his busts.

At Pompeii, in the street of the Silversmiths, the masonry and mouldings incline almost imperceptibly with the slope of the street. 28.

At Rome, in the palazzo Spada by Borromino, an extraordinary effect is produced by diminishing the width and

height of the columns, in a length of 30 ft., from an opening 10 ft. wide to one of 4 ft.: it gives a great effect of distance. This was practised by SERLIO, p. 354-6 and 77, where he explains how he gets his perspective lines for the scenery out at the back, instead of on the back, of the stage. The Airla chapel in Sta. Maria in Trastevere, at Rome, by A. Gherardi, has a perspective illusion; ROSSI, *Altare*, pl. 34. At Florence, in the church of Sta. Maria Novella, the nave has seven pillars diminishing from the front to the transept. At Erbach, the later dormitory (1300-1400) 232 ft. long and 42 ft. wide in the clear, has short, round columns with manifold capitals, from which spring high pointed arch vaults 20 ft. wide. Every one of the pillars, of which there are ten in a row, exceeds the preceding one in height; the first is 5 ft. 3 in., and the last 6 ft. 5 in., so that if a spectator stands near this last, the diminishing of the rest, which the perspective causes, is increased, and consequently the whole space appears larger; but when standing at the other end, the columns all appear of equal height; WHEWELL, *Arch. Notes*, 8vo., 1842, p. 158. At S. Gilles, the church rapidly narrows towards the chevet; *Monuments Historiques de France*, ii, pt. 1. All these arrangements are, in execution, too obviously artificial, and fail of their object.

The *scala regia* at the Vatican, designed by Bernini, has sixteen Ionic columns on each side, and a waggon vaulted ceiling. The side walls approach each other, the widths at the bottom and the top being respectively as 5 and 3; and the columns, the vault, and architectural details, all diminish gradually in like proportion from the lower to the higher level, thus giving an appearance of long drawn perspective to the staircase. A plan and section is given in FONTANA, *Templum Vaticanum*, fol., Rome, 1694, i, 239; and a perspective view of the lower flight is given in PISTOLESI, *Il Vaticano descritto*, fol., Rome, 1829-38, viii, 158, pl. 144. (A. C.)

In the Xanthian Ionic Heroum, the painted bead and reel between the ranges of coffers is shaded so as to give it the effect of a sculptured ornament: "I am not aware of any other instance of this practice", says FALKENER, *Museum*, 8vo., 1860, i, 282, and illustration. The ornament on the cyma of a fragment, is carved in a straight line between the perpendicular and a right angle with the slope of the pediment; INWOOD, *Erechtheion*, fol., London, 1827, p. 138, pl. 26, as first observed to him by C. R. Cockerell. COLLING, *On Form, Light and Shade, in Architectural Foliage*, in BUILDER *Journal*, 1855, xiii, 620-1.

In the house of the tragic poet at Pompeii, a style of *painting* was adopted which, though calculated to decorate a wall, is by no means intelligible on a nearer approach. From a certain distance a town, or tent, and something like a marriage ceremony, might be perceived, but which vanished into an assemblage of apparently unmeaning blots. Another chamber represented an entire farmyard: GELL, *Pompeiana*, 8vo., London, 1832. i, 165; who, 166, describes an apartment representing green damask, and decorated with a profusion of pictures, in the palazzo Sannizzi, at Ricti, a method of decoration carried out in certain modern Italian habitations.

The effect of light and shade at the angle pinnacles of the spire at S. Denis, they being set at a slight angle to each face of the tower, is remarked upon by VIOLLET-LE-DUC, *Dict.*, *s.v.* Flèche, p. 436. He notices *s.v.* Trait, p. 203, the peculiar arrangement of the lines of the centres of the chapels round the apse of the same building, running to a spot in the front of the altar; and *s.v.* Triforium, p. 296, the advantage obtained in the clearstory of the choir at Seez, of S. Denis, and of the cathedral at Amiens, by making the tracery of the exterior glazed openings of a different design to the inner ones.

BREWSTER, *On some optical illusions connected with the inversion of Perspective*, read at the British Association for the Advancement of Science, June 1860; ATHENÆUM *Journal*, p. 24; footprints are stated to have appeared as elevations in place of depressions. In the church of S. Agostino at Rome, a painted festoon above each arch appears concave or as an intaglio, instead of in relief as painted; and in the church of Sta. Giustina at Padua, are three cupolas, the first appears very shallow, the next deeper, and the third deeper still; yet they are all of the same size; PENNY CYCLOPÆDIA, *s.v.* Magnitude; and Supp. *s.v.* Enlargement of Objects.

In order that a semicircular arch should appear to be a semicircle when placed on the impost, it was a rule, as given by ALBERTI, that it should be made higher by one-seventh part of its diameter. In the end of a saloon having a wide opening between pilasters, the cornice lines of a semicircular bow beyond had the effect of making the horizontal soffite of the opening appear to curve considerably *upward*. It would require careful consideration, and a regard to the appearance from different points of distance, to determine how much real sag to give to the soffite, in order to obviate the imaginary camber anticipated. An instance of a straight iron tie rod to a roof of 50 ft. span, appearing to be lower by 5 or 6 ins. in the middle, is given by PENROSE, in BUILDER *Journal*, vi, 122. Certain illusions can be caused and be remedied by the juxtaposition of curved lines: a familiar instance is seen in the perpendicular jambs under an arch, which invariably appear wider apart at their junction with the arch, than at their bases (BARTHOLOMEW, *Specifications*, Art. 595), where the line is not broken by an impost.

J. CARPENTER, *Eyes deceiving and Eyes deceived*, in ONCE A WEEK *Journal*, 2nd December, 1867, describes the apparent change of size in the full moon when seen rising and after a few hours have passed (but attributable by some to its being seen in the former case through the magnifying medium of moist air): two parts of a ring placed one above the other, as to which appears the larger: the effect of drawing parallel lines across a number of zigzag ones, making the form look sloping: and that the direction of a line placed at an angle and touching the upper line of two parallel ones drawn some distance apart, will take from the lower line when continued at the same angle: the attempt of dividing a straight line into two equal parts, or judging the middle of a straight line: the height and width of two sets of vertical and horizontal lines, as to their difference of appearance: the arrangement of a few type S's, X's, Z's, 3's, and 8's side by side, when the upper half will appear larger than the lower; and some other similar optical illusions. If a certain number of thick black lines be drawn vertically, and at a little width apart, and the same number be drawn horizontally, it may probably be found by the person looking at both of them, that the vertical lines can be seen distinctly at a greater or lesser distance than the horizontal ones; which proves that the vertical meridian of the eyes of that person differs in focal power from the horizontal—this has been termed Astigmatism. Of course different eyes differ in different meridians, therefore the lines should be arranged in various directions when tested, and the variations noticed. CHROMATOBLEPSY or colour blindness.

PENNETHORNE, *Elements and Mathematical principles of Greek Architects and Artists*, 8vo., London, 1844. PENROSE, *On the Entasis and other curved lines of the Parthenon*, read at Inst. of Brit. Archts., Session 1845-46; printed in CIVIL ENGINEER, etc. *Journal*, ix, 97 and plate. PENROSE, *On the Geometric lines and Optical corrections of the Greek Architects*, read at the same, Session 1847-48; printed in BUILDER *Journal*, vi, 111, 122; and CIVIL ENGINEER, etc. *Journal*, xi, 150. PENROSE, *Investigation of the Principles of Athenian Architecture; or, the Results of a Recent Survey, conducted chiefly with reference to the Optical Refinements exhibited in the Construction of the Ancient Buildings at Athens*, fol., Lond., 1851: reviewed in BUILDER *Journal*, x, 81-2; and the LITERARY GAZETTE *Journal*, No. 1836, March 27th, 1852, p. 307. G. H. GUILLAUME, *Optical correction in Design*, in BUILDING NEWS *Journal*, 1869, xvii, 123 and 302. *Æsthetics*

of Gothic Architecture, in British Quarterly Review, August 1849; and *Æsthetics of Greek and Egyptian Architecture*, February 1850. César Roma, *Les lois de l'optique et l'Architecture Grecque*, in Le Moniteur des Architectes, Ser. 2, 1869, iv, 4, 72, 106, 175. Burnouf, *Explications des courbes dans les édifices doriques Grecs*, in Daly, *Revue Générale*, 4to, Paris, 1875, xxxii, 145; 153. J. Pennethorne, *The Geometry and Optics of Ancient Architecture, illustrated by examples from Thebes, Athens, and Rome*, fol., London, 1877. W. P.

OPTICS. That branch of physical science which treats of light and vision. By optics, particularly that part which is called perspective, the artist is enabled to judge with precision of the effects of his compositions when carried into execution, and also to represent them more pleasingly in design, as well for his own satisfaction, as to give his employers a better idea of his intentions than could be collected from geometrical drawings; Chambers, *Decorative Part*, etc., fol., London, 1759, intro.

Euclidis *quæ supersunt omnia, ex recensione* D. Gregorii, fol., Oxford, 1703. Peyrard, *Œuvres d'Euclide*, Paris, 1814; Gr., Lat., and French text. Coddington, *Optics*, 2nd edit., 8vo., Camb., 1825. Sir D. Brewster, *Optics*, London, 1838; and in the Cabinet Cyclopædia. Lardner, *Handbook of Natural Philosophy*, 1851. Nugent, *Treatise on Optics*, or Light and Sight theoretically and practically treated, with the application to Fine Art, and Industrial pursuits, 8vo., London (1868). Griffin, *Treatise*, 2nd edit., 8vo., 1842. The several Encyclopædia.

OPUS (Fr. *appareil;* Ital. *opera*). The Latin for "work", as intended to designate construction, or arrangement of materials, in ancient Greek and Roman times. The articles within brackets are not inserted in this work.

Aceratum	Græcum; and Græcanicum	Pseudisodomum (three kinds), bedded work of unequal courses
Albarium	Hyalostrotum	Quadratum
Alexandrinum (Amusseatum)	Imbricatum	Reticulatum, outside facing to rubble work
Amygdalatum	Incertum, random work (Intagliatura)	Sculpturatum
Anaglyphicum (Anglicum; Embroidery)	Intestinum	Sectile
Arenatum	Isodomum (three kinds) bedded work of equal courses	Segmentatum
Barbaricum		Signinum or concrete
Cerostratum	(Lateritum)	Spicatum
Chrysendatum	Lithostrotum (Multicolore)	Subtegulanum
Cæmentariorum	Musivum	Tectonicum (metal work)
Cæmentitia	Orthostratum	Tesselatum
Diamicton	Phrygium	Topiarium
Diatonum	Polychromaticum	Vermiculatum (three kinds)
Emplecton	Polygonum	
Figlinum		
Formaceum or Formarium		

Opera di Commesso, see Florentine Mosaic, and Commesso. Inlaid Work. Greek Masonry. Lesbian Walling. Mosaic Work. Polygonal Walling.

ORAM (William), "was bred an architect, but taking to landscape painting arrived at great merit in that branch. He was made master carpenter to H. M. Board of Works, by the interest of sir Edward Walpole, who has several of his pictures and drawings"; Walpole, *Anecdotes*, 1st edit., 1762-71; 1849 edit., p. 711. In the Crowle collection of prints, etc., in the British Museum, iii, 172, is a drawing by him of an arch erected in Westminster Hall, dated 1761.

ORANGE (Lat. Arausio). A town in the department of Vaucluse in France. It contains more Roman antiquities than most other towns in that country. 1. A triumphal arch of the Corinthian order (modillion), probably of the age of Augustus or of Marcus Aurelius, has three archways, and is 66 French feet wide and 60 ft. high (72 English ft. by 65 ft. 6 in.); Laborde's plan gives only 60 Fr. ft. by 26 ft. depth at the bases of the columns; the vault of the larger arch is richly sculptured, as are the attics; it has been greatly restored. The name mario being on a shield, the arch has had that name given to it. 2. The back of the *scena* or stage of a theatre, composed of large stones, some 15 ft. in length, without cement; it is 317 ft. long and 109 ft. 7½ in. high (also called 334½ ft.. 111 ft., and 13 ft. thick, in *Handbook*), and some other portions of the building, which is said to be the most perfect Roman theatre in existence. 3. A circus or hippodrome has gradually nearly disappeared; it was about the same length as that of Maxentius at Rome. 4. Of the aqueduct there exist remains at Vaison, several miles distant, as well as a few other fragments; and various portions of antiquity are to be seen in the private houses of Orange. One of the churches was formerly cathedral; the diocese was suppressed at the Revolution. The Protestant church is remarkable for the boldness of its architecture. Some additions were made to the *palais de justice*, by A. J. Frary, *cir.* 1834. A statue of the first Raimbault de Baux, killed at Antioch 1099, was erected 1846.

Caristie, *Notice sur l'état actuel de l'arc et du théâtre*, fol., Paris, 1839. Merimée, *Voyage dans le midi de la France*, 8vo., Paris, 1835, p. 165-71. Pownall, *Notices*, 4to., Lond., 1788. Hughes, *Provence*, 8vo., London, 1822. Chapuy, *France Mont.*, fol., Paris, 1842, pl. 71. Laborde, *Mont. de France*, fol., Paris, 1816, pl. 48-54. Frossard, *Tableaux, etc., de Nismes*, 8vo., Paris, 1846, p. 154. Maffei, *Galliæ Antiquitates*, 4to., Paris, 1733, p. 140-50. Fergusson, *History of Arch.*, 1867, i, 301, illustrates the theatre. 14. 25. 28.

ORANGE. One of the secondary colours, produced by three parts of yellow and five of red. Orange harmonises with the remaining primary blue in the proportion of eight either as to surface or intensity: it is also a complementary to blue; Redgrave, *Manual of Colour*, 12mo., London, 1853. Chrome (orange). Vermillion (orange). Cadmium yellow approaches the nearest to pure orange, but several inferior pigments, mostly prepared from lead and chrome, exhibit fine orange hues; Fairholt, *Terms in Art*, 8vo., London (1870).

ORANGE YELLOW. A yellow inclining to red, represented by molybdate of lead: Ansted, *Elementary Course*, 8vo., London, 1850.

ORANGE TREE; Citrus. It is supposed to have been first cultivated in Italy in the fourteenth century: and to have been cultivated in England since 1492 (Penny Cyclopædia), but Brayley, *Surrey*, iv, 66*, says that Sir Francis Carew (died 1649) was the first who brought this tree from Italy; they were planted in the ground at Beddington in Surrey; many were 13 ft. high in 1690; and were destroyed in the hard frost of 1739-40. Loudon, *Encyc. of Gardening*, states there are three trees in boxes at The Wilderness in Kent, not surpassed by any trees so grown in Europe; and that at Saltcombe in Devonshire, there are in a few gardens, orange trees which have withstood the winter in the open air for upwards of a hundred years. Orange trees are usually planted in boxes and removed from the conservatory into the open air in summer, in France as well as in England: if left out in the open air they must be matted up. 14.

ORANGERY. A building in which orange trees are preserved during the cold months: it should face the south and south-west, and the windows should only be on those sides; they should have double sashes, the inner ones being closed on the coldest nights. The north wall should be thick and solid. The only object being to protect the trees from frost, there should be as much light and air as possible; the building need not therefore be deep; and only sufficient artificial heat need be provided to effectually prevent the temperature falling below freezing point. The position and soil should be thoroughly dry. Evelyn, *Diary*, says, "1688, Sir Henry Capel's orangery and myrtellium at Kew, most beautiful and perfectly well kept up: he was contriving very high pallisadoes of reeds to shade his oranges during the summer, and painting these reeds in oil." In addition to the description given in conservatory, of a building thus called,

some of the better known ones may be named for inspection. The large ones at Versailles: at Meudon; Berlin; Anspach, 300 ft. long and 30 ft. wide and high; Heidelberg; Vilmarini, near Vicenza, "eleven score paces long", as seen by Evelyn, about 1645; Venerie palace near Turin, 600 ft. long; Oranienbaum in Russia, by Rusca, *Recueil*, fol., pl. H, 50; and I, 34; Windsor; 1696, Wollaton; 1761, Kew (or greenhouse), by Sir W. Chambers, 142 ft. long. 30 ft. wide, and 25 ft. high, heated by flues; Kensington Gardens; 1662, Greenwich, Loader's, the anchor-smith, are noticed in Loudon, *Encyc. of Gardening*, 8vo., London, 1850.

Designs are given in Normand, *Paris Moderne*, 4to. Paris, 1845, pt. 2, pl. 113; in La Propriété *Journal*, 4to., Paris, 1833, etc., pl. 1-3 (and 31, 2 ser.) Hunt, *Archit. Campestre*, 4to., London, 1827, p. 14, pl. 7. 25.

Orangery also designates the *parterre* in a garden where orange trees are planted out, or placed out in their boxes. 5.

ORATORIANS, or Fathers of the Oratory. A congregation constituted by Filippo de' Neri about 1550, and approved by pope Gregory XIII in 1575, which soon spread over Italy, France, and other countries. He did not bind the members of his congregation by perpetual vows, the spirit of charity being the only common bond. Study, preaching, and the education of youth, were the chief occupations of its members. Their handsome church of Sta. Maria in Vallicella, better known as la Chiesa Nuova, at Rome, was designed by M. Lunghi 1575; the interior was designed by P. da Cortona; the monastery adjoining, forming their head-quarters, and now the assize and other law courts, is one of the best works of Borromino: it has a good library; and the "oratorios" or sacred musical entertainments founded by him, hence deriving their characteristic name, continued to be performed in a chapel devoted to the purpose. Rohrbacher, *Hist. Univ. de l'église Cath.*, 8vo., Paris, 1869, xii, 650. The congregation was introduced into England on the secession of Dr. Newman 1846. At Genoa is their church of S. Filippo Neri, which has a very gaudy oratory attached to it, 1749, by G. B. Montaldo; and at Florence, the church of S. Firenze having a monastery of the Order attached to it, which were designed 1772 by Z. del Rosso. At Paris, their church in the rue S. Honoré, called l'Oratoire, built 1616-30 by Metezeau and J. Le Mercier, was at the suppression of the order 1792, converted to secular uses, and since 1811 has been occupied by a Protestant congregation. Another congregation of the Oratory was founded 1611, by Pierre de Bérulle, for the education of those preparing for sacerdotal functions.

ORATORY. A place consecrated to prayer. Lararium. A small building or apartment for private devotion, attached to, or formed within a mansion, church, or monastery. Oratory was the name for a private or domestic chapel, as early as Sozomenus, *Vita*. There is a tradition, that the early Christians met in private houses until the persecutions, and then in the catacombs, and to such chapels or places of worship, the term *oratorium* or house of prayer was given; and thus this term was also applied in ancient times to a public church; Bingham, *Origines*, 8vo., London, 1840, ii, 343, who says, "in those ages an oratory and a catholic church seem to have differed, as now a private chapel and a parochial church, though the first ages made no distinction between them." Oratories were condemned by several synods. Walcott, *Sacred Archæology*, 8vo., Lond., 1868, enumerates six sorts of chapels in which no mass could be said without permission of the ordinary: 1, a monk's cell: 2, a private chapel recognised by the Council of Agde in France, 506; 3, a chapel in the country without a district; 4, the private portion of a minster reserved for the convent; the choir; a chapel attached to the chapter house; 5, a burial chapel or a chapel in a cemetery; and 6, a chantry chapel in a church.

A small chapel or chantry is sometimes called an oratory. Gattico, *De Oratoriis Domesticis et de usu altaris portatilis juxta veterem ac recentem Ecclesiæ disciplinum*, fol., Rome, 1746. *On Domestic Oratories*, in Ecclesiologist *Journal*, 1849, ix, 362.

In Ireland a large number of oratories were built previously to the erection of churches; the former were about 23 ft. by 10 ft.; the largest of the latter rarely exceeded 60 ft. (Petrie, *Round Towers*, etc., 8vo., Dublin, 1845, 2nd edit.), the size named by S. Patrick for one of his churches, and nearly the same as the original church at Glastonbury, the naves of Brixworth, Worth, and the one in the castle at Dover, three of the oldest remaining pre-Norman English churches. Brash, *Eccles. Arch.*, 4to., Dublin, 1875, classes those in Ireland: 1, about 10 ft. by 7 ft. inside, and rude; and 2, about 22 ft. by 15 ft., of a more advanced type. Ancient Cornish oratories are simple parallelograms, containing a stone altar and well; they are sometimes raised on artificial mounds. That of S. Piran in the sands at Perranzabuloe, was uncovered in 1835 and again in 1843. S. Gwithian, near Hayle, perhaps an older structure, was uncovered about 1829.

In Madeira, the method employed in establishing the church was by building an oratory (*erméda*) in each district, which became the nucleus of the future parish: these buildings have well-defined naves and chancels. In England in the present time, a temporary iron church is built, and when a sufficiently numerous congregation has been collected, and the necessary funds provided, the erection of a more substantial and permanent fabric is proceeded with.

At Rome are some small churches called "oratories", as the Oratorio de la via Crucis or Campo Vaccino; of S. Marcello; of Sta. Maria del Monte Carmel, etc. At Venice, the church of S. Roch; and many large churches in other cities are so designated. 10. 19. 25. 96.

ORB. A globe surmounted by a cross; an emblem of power and sovereignty, with which kings are solemnly invested at their coronation. It is introduced in representations of our Saviour as a child, and also in images of the majesty. The cross is placed on the top of the orb to signify (it is said) that by the cross the world, represented by the ball, is chiefly glorified: Fairholt, *Terms in Art*.

Orb. A circular knot of flowers or herbs (Boss), fixed at the intersection of several ribs in Gothic vaulting to conceal the junction of the mouldings, and serving as an abutment to them: being a keystone in fact. The word occurs in W. Wyrcestre, *Survey of Bristol*, 1480. Dallaway, *Discourses*, 8vo., Lond., 1833, p. 175.

Orb. A mediæval word for a blind window. Also the panels in Third Pointed wall-work; so called because they were as it were blank windows. Probably derived from the Fr. *orbe*, a wall without openings either of doors or windows; Lat. *orbus*, deprived of. 23. 16.

ORBAI or ORBAY (F. d'), see Dorbai (F.) Since that article was written, it has been ascertained that he was buried 5th Sept. 1697, aged 63 years, in the church of S. Germain l'Auxerrois, at Paris. He was "architecte ordinaire des batiments du roi".

ORBAIS (Jean d'), was one of the five architects engaged upon Reims cathedral in the thirteenth century, and might have been employed on the church at Orbais, the choir and sanctuary of which are a reproduction on a smaller scale of those at Reims; Comité Historique, *Bulletin*, 8vo., Paris, 1842-3, ii, 249.

OR BASANÉ. The name given to leather stamped with diaper patterns in gold, and used as wall hangings during the sixteenth and seventeenth centuries. Diaper.

ORCAGNA or Orgagna, said by Gaye, *Carteggio*, 8vo., Flor., 1839, i, 52, to be a corruption of Orchanguo or Orchangnio; see Cione (A. di).

ORCELIS. The ancient name of Orihuela in Spain.

ORCHARD HOUSE. Such a building was at first nothing but a greenhouse without fire-heat; but after a time various

modes of heating were recommended, but it was still called an orchard house. Glass is a great protection without artificial heat; and fruit trees in pots are interesting. It is still a common term for a peach, a cherry, or a fig house. They are recommended to be all glass and iron, and no other ventilation required than an opening in each gable of about a foot in depth: the paths to be of gravel. GREENHOUSE.

ORCHARD (JOHN), stonemason, of London; £5 was "paid to him (31 May, 50 Edward III, 1376-77) by his own hands for making divers images in the likeness of angels, for the tomb of Philippa, late queen of England (died 1369), within the abbey of S. Peter at Westminster", etc.; and other monies passed through his hands; the tomb itself was made by "Hawkin Liege from France" at a cost of 200 marks: DEVON, *Issues*, 4to., Lond., 1837, p. 189; 199 *bis*; 201. SCOTT, *Gleanings*, 8vo., Oxford, 1863, p. 63: 170. ORCHYERD.

ORCHESTRA. That part of the area of a Greek theatre, comprised between the lower range of seats and the proscenium, in which the chorus was placed—where the dances were performed. It was a nearly circular level space, open to the sky; one segment of the circle was appropriated to the stage. In the centre of the circle was the *thymele* or altar of Dionysius. In a wider sense the orchestra also comprised the broad passages, *παροδοι*, on each side between the projecting wings of the stage and the seats of the spectators, through which the chorus entered the orchestra, and generally arranged itself between the stage and the *thymele*, which itself is said by some writers to have been of a square form, and used for various purposes, as a funeral monument, an altar, etc., according to the nature of the play. It was of wood, and stood on a raised platform with steps on all sides, and was used by the leader of the chorus, by a musician, etc. 78.

The best plan of a Greek theatre, that of the Dionysiac theatre at Athens, is given in DYER, *Ancient Athens*, 4to., London, 1873.

BULENGERUS, *de Theatro*, 8vo., Troyes, 1830, supposed that the orchestra of a Greek theatre was divided into two parts, and that the *thymele*, as one of them, was a platform, more elevated than the other, and immediately in front of the *logeion* or stage, and appropriated to the chorus; whereas the lower space which must have the *conistra*, he does not seem to have applied to any specific purpose, nor does he define how great a portion of the orchestra was occupied by the *thymele*. He has been quoted and followed by DONALDSON in a vignette plan given in STUART and REVETT, *Antiq.* (Suppl.), fol., London, 1830, iv, who marks the path of the chorus *round* the *thymele*. *Conistra* would seem to be the proper name of the whole or part of the platform for the *thymele*, if those writers are correct who say that the chorus was obliged to perform its evolutions within the *conistra;* for it can hardly be supposed that the chorus would be in the lowest part of the area, and away from the *logeion*. Another explanation has been that the *conistra* was the entire area (of the orchestra) in which the *thymele* stood, and that the chorus performed its evolutions on a platform two or three feet lower than the *logeion*, and extending from the *logeion* to the *thymele;* in this case manifestly the chorus could not have passed round the *thymele*. *Conistra*, as inscribed on the plan above named, is the fittest place, as being the lowest area of the orchestra, for the appearance of the Furies, etc., from the Charonic staircase, which POLLUX, *Onomasticon*, iv, affirms, was under the *coilon*. *J. W. P.

In the Roman theatre the orchestra, appropriated to the senators and other distinguished persons, was not more than a semicircle, the diameter forming the front line of the stage. There was no *thymele*. Society for the Diffusion of Useful Knowledge, *Pompeii*, 8vo., London, 1831, i, 231-4; 260-7.

ORCHESTRA. The place in modern structures, as in a theatre, allotted to the instrumental bands; or that part in a concert room assigned to the musical performers, both instrumental and vocal. The term is also applied to the musicians collectively, hence the words band and orchestra are synonymous. It is also called a music gallery. The front of an orchestra in a concert room is recommended to be five feet above the floor of the room, and rising rather steeply to the back, the corners of which should be rounded off, so that the whole body of sound may be directly reflected. The orchestra of Exeter Hall, London, was considered (in 1840) rather too wide, as to a delicate and experienced ear a perceptible interval of time elapses before the sound produced on one side is heard on the other. But much wider ones have since been erected. The new arrangement for eighty performers at the Philharmonic Concerts 1846, at Hanover Square rooms, is shown in ILLUSTRATED LONDON NEWS *Journal*, viii, 194.

COMPARATIVE DIMENSIONS OF THE PRINCIPAL ORCHESTRAS OF THE COUNTRY.

		Area in square feet
CRYSTAL PALACE	Handel Commemoration	16,016
LEEDS	Town Hall	2400
LONDON	Hanover Square Rooms (now 1876 a club)	943
"	S. James's Hall	1271
"	Buckingham palace, concert room	1731
"	Westminster abbey, Handel commemoration, 1784	2425
"	Surrey Gardens	1280
"	S. Martin's Hall	1773
"	Exeter Hall, Sacred Harmonic Society	3645
YORK	Cathedral, Musical Festival, 1823	2138
LIVERPOOL	Philharmonic Hall	1584
BRADFORD	S. George's Hall	1590
BIRMINGHAM	Town Hall	2656

Outline plans of these galleries are given with the above list, in *The Handel Commemoration Festival*, 1859. In the article MUSIC HALL, a list of such buildings is given.

ORCHOMENOS. A city of Bœotia or Beötia, in ancient Greece, situated on the western shore of lake Copais. It was known as a place of great power and wealth in the earliest period of Grecian history, and traces of its former strength and magnificence still exist. The Thebans destroyed Orchomenos B.C. 368; it was rebuilt after the destruction of Thebes; and is mentioned about twenty years after the death of Alexander (323 B.C.). At the east foot of the acropolis are the small remains of the treasury of Minyas, erected 10 or 12 cents. B.C., described by PAUSANIAS, ix, c. 36, s. 2, as being equal to any similar building which he had seen, and the wonder of all the country. The building is circular, about 68 ft. in diameter, and of white marble. The entrance is entire, though a great part of it is now buried in the ruins of the structure, only six large blocks of regular masonry remaining above the ground; "the supercilium or lintel is exactly similar to the one at Mycenæ; its inner face is 16 ft. 4 in. long, and 3 ft. in height, concave on plan, and following in its profile the sweep of the dome; its depth varies from 7 to 8 ft. This vast block is supported on three courses of stone about 1 ft. 4 in. high each"; STUART, *Antiq. of Athens, etc.—Mycenæ*, by T. L. DONALDSON, fol., Lond., 1830, iv, 26. This lintel is also described as 15 ft. 4 in. long; 3 ft. 3 in. high, and 6 ft. 3 in. in depth. Remains of the subterranean outlets of the lake still exist. The mythological architects, Trophonius and Agamedes, who erected the Delphic temple, are said to have built a treasury for Hyrieus at this place: DUDLEY, *Naology*, 8vo., Leicester, 1846, p. 376; 346. MÜLLER, *Orchomenos und die Minyer*; GELL, *Itinerary of Greece;* CLARKE, *Travels*, vii, ch. 5. DODWELL, *Cyclopean Remains*, fol., London, 1834, gives plates of the treasury, a gate of the acropolis, and walls and towers; and has engraved a very curious sun-dial found there. 2. 14.

ORCHOMENOS. An ancient place in Arcadia, supposed to be now represented by Kalpaki. DODWELL, *Cyclopean Remains*, fol., Lond., 1834, gives a view of it. LEAKE, *Morea;* GELL, *Narrative of a Journey*.

ORCHYERD, ORCHEYERDE, and ORCHYARDE (WILLIAM)

was employed as "master of the masonry at the college of S. Mary Magdalen at Oxford, by William Waynfleet, bishop of Winchester, who founded it 1457, and with whom he bargained 1475, 1479-80, to finish "the tower over the gateway with a pyramid 16 ft. high above the level of the gutter; to crown the walls of the chapel and hall with enriched battlements, with coping to these and the library; to complete the chambers, cloisters, and other imperfect portions of the fabric; and to fashion the great window of the chapel, with the windows of the chambers, after the model of All Souls". The bishop also agreed with Orchyerd for the digging of a sufficient quantity of stone at Headington, to be delivered within a limited time, for the use of Eton College, and of his own college, which was commenced 5th May 1474, and completed 1479. "The contracts are still extant in the muniment room of the college, from which it appears Orchyerd was not only the supervisor, but the architect and designer"; Walpole, *Anecdotes*, edit. by Dallaway, 8vo., London, 1826, i, 213. Chandler, *Life of W. of W.*, 8vo., London, 1811, p. 137, 154. Pugin, *Examples of Gothic Arch.*, 1838, i, 10-12, pl. 17-26. Chalmers, *Hist. of the Univ.*, i, 201. Wood, *Hist.*, by Gutch, iii, 310, gives details.

ORDER IN ARCHITECTURE. The word "order" has a general acceptation not requiring any definition; it is one of those primary ideas which carry their explanation with them, and which serve to explain other words, rather than require any other words to explain them; thus there are few words in more general use. The article on this subject by Quatremère de Quincy, *Dict.*, 1832, is translated in Loudon, *Arch. Mag.*, 8vo., Lond., 1836, iii, 441-50.

ORDER OF ARCHITECTURE. The name given to the column and its entablature, the chief details of the decorative portion of Greek, Roman, and Italian architecture. The Greeks used three orders, the Doric, the Ionic, and the Corinthian; to which the Romans added a plainer one called the Tuscan, and a richer one called the Composite, combining the Ionic and the Corinthian. The proportions vary with the lightness of the order, the arrangement of the mouldings varies in each, and each order has been noticed in this work. The proportions given by the ancients and moderns of these five orders have been tabulated by W. H. Leeds, expressly for Pugin, translation of Normand, *Parallel of the Orders*, fol., London, 1829, which is reprinted in Weale, *Dictionary of Terms*, 12mo., London, 1850, *s.v.* Architecture. This list must be now accepted with reservations, and compared with later measurements for accuracy. The proper understanding and application of these orders constitute the foundation of all excellence in the art of architecture. Mauch, *Neue Systematische Darstellung*, 3rd edit., 4to., Potsdam, 1845, and Normand, have now superseded Freart de Chambray, *Parallèle*, fol., Paris, 1650, and its useful translation by Evelyn, 1664; 1707; 1723. Gwilt, in his edition 1825 of Chambers, *Decorative Part*, etc., p. 41, gives the proportions of a number of examples. Chipiez, *Histoire critique des origines et de la formation des Ordres Grecs*, 4to., Paris, 1876.

A sixth order has been attempted to be designed. Philibert de l'Orme proposed to make the column represent a tree having the branches twisted underneath, to form the entablature. Many years afterwards a prize was offered (under Louis XIV) to the architect who should succeed in the invention of a sixth order. In England, Emlyn, *Proposition for a New Order*, fol., London, 1781, and De la Roche, each designed one. In Germany, L. Sturm pretended to have founded what he called a "German order", the cap having one range of leaves and sixteen volutes. Wagner proposed another, Leipsic, 1728. C. le Brun, published *Nouvel Ordre Français*, folio: Ribart de Chamoux, *De l'ordre Français trouvé dans la Nature*, folio, Paris, 1783. J. d'Olivet, *Cinq Ordres de l'Arch.*, with a sixth, *François*, 1711 (in Harl. MS. 6337 in British Museum); and R. le Virloys executed an "Ordre François" in the theatre at Metz, engraved in his *Dict.*, 4to., Paris, 1771, pl. xix. 6.

S. le Clerc, 1714, gave a "Spanish" and a "Roman order"; in the former, sustaining the horns of the abacus with little volutes and placing a lion's head in the middle instead of a rose, as a symbol of the gravity, strength, and prudence of that nation. In the "French order" cocks' heads, fleurs-de-lys, etc., symbols of that nation, were introduced; Chambers, *Decorative Part*, etc., fol., Lond., 1759, pl. 11, gives a similar "French order"; and (Gwilt's edition, p. 153) notices many attempts at a new order. Composed order. Piranesi designed a church at Rome, wherein he used a symbolical capital. 4. 6.

Batty Langley, *Ancient Architecture restored*, 4to., Lond., 1742; and Carter, in Gentleman's Magazine, 1801, lxxiv, 136, applied the word *order* to the different classes of architecture of the middle ages, with no success.

The manner of framing the orders in wood, is given in Krafft, *L'art de Charpenterie*, fol., Paris, 1805, part 2, pl. 5; and in some old works in English.

ORDER ABOVE ORDER. An arrangement consisting in placing rows of columns with their entablatures one above the other, the plainer one being always the lower of the two. As every order has its proper system of inter-columnation, and as the centre of the column above must be placed over that of the one below, it follows that the upper order is not in its proper proportion. One of the most familiar examples in England of this inappropriate use of the "five orders", is the gateway at the Public Schools at Oxford, erected 1613-19. The treatises by the masters of architecture, as Palladio, Scamozzi, Vignola, Chambers, and others, describe the arrangements to be made for each order.

ORDERS; RELIGIOUS. A table of eighty-four religious orders chronologically arranged, dating from 305 and ending 1537, is given in Taylor, *Index Monasticus*, fol., London, 1821, p. xxvii, chiefly collected from *L'histoire du Clergé Séculier et Régulier*, and corrected from other authorities. Another list, differing from the above, and including other orders, is given in Rohrbacher, *Histoire Universelle de l'église Catholique*, 8vo., Paris, 1869, p. 337-8. The religious orders were of three kinds; monastic, military, and mendicant. Monastic Orders.

The difference between monks and friars was this: monks had nothing in proprietorship, but all in common; friars had nothing in proprietorship or in common; but, being mendicants, depended on charity; they had cells, but no revenues at first, though in time benefactions increased the number of cells and created considerable revenues: Godwin, *English Archæologists' Handbook*, 8vo., Oxford, 1867, p. 133, who gives a list of the orders that settled in England. Dugdale, etc., *Monasticon Anglicanum*, fol., Lond., 3 vols., 1655-73.: 8 vols., fol., 1817-30: Reprint with omissions, 8 vols., fol., 1846.

ORDINATIO. This Latin word is used by Vitruvius, B. i, c. 2, who says "Architecture depends on *ordinatio*, (or fitness), and *dispositio* (or arrangement), the former being called τάξις in Greek.—Ordinatio is the adjustment of size of the several parts to their several uses, and requires due regard to the general proportions of the fabric; it arises out of dimension *(quantitas)*, which the Greeks call ποσότης. See also *Detached Essays*, Pocock, *Elements of Design*, 1849, decor. disposition. The term ordonnance is used in the French language for this word; and it occurs in some early English works upon architecture, as in Evelyn, who explains it as "the determining the measure of what is assigned to the several apartments"; and it has been explained (1736) as "The just quantity and dimensions given to a building agreeable to the model". 1. 2. 4. 6. 25.

ORDINATOR. A designation occurring (1365-66) in the *Fabric Rolls* of the palace of Westminster: "Hugh Herland, carpenter, "apparator operantium et ordinator operis carpent.,"

was paid 8d. per day; Brayley and Britton, *Palace of West.*, 8vo., London, 1836, p. 196; who translates *Apparator* as "director", but it would be better rendered "foreman", and *ordinator*, as manager. A person of the same sirname was "master carpenter" and had 1s. per day. Ordonnateur.

ORDINAUNCE. The masons employed at King's College Chapel, Cambridge, 1476, covenanted to provide "lyme, sand, scaffolding, mooles, ordinaunces"; which last word was supposed by Britton, *Dict.*, to mean "engines": or it may mean "templets". In an Anglo-Norman lexicon this word is explained as "orderly disposition". Ordonnance.

ORDONEZ (Gaspar), of Madrid, built between 1590 and 1611 the body of the church of the Stma. Trinidad at Madrid; the east and south sides of the cloister, and the great dormitory placed north to south, probably from the designs of Juan de Valencia: A. Marcos built the fine staircase therein 1681-20. Ordoñez designed and built the church of S. Martin at Madrid (Doric), disfigured by two large chapels attached, and a very poor altar piece; destroyed by the French 1809. The cupola was designed by Lorenzo de S. Nicolas, son of Juan de la O. On one side of the basement of the church he built 1601 a chapel for himself, as recorded in an inscription therein, which states that he was *maestro-mayor* of the church. In March 1602, Ordoñez went from Madrid to Alcalá de Henares, for the purpose of laying the foundations of the church of the Jesuits, and directed the construction of that fine edifice, for which he was paid 1400 reals per annum, until the year 1608, when he was succeeded by Agustin Ballesteros. It is doubtful whether it was designed by Ordoñez or not: the drawings had been brought from Madrid at a cost of 50 reals, and perhaps the services of F. de Mora had been obtained in making them, as those of J. Gomez de Mora had been previously, in designing the façade of the same church. Ordoñez is supposed to have died between 1611 and 1618. 3. 66.

ORDONNANCE. This French term (occasionally used by English writers) when applied not to architecture in general but to one building in particular, means the manner in which the architect arranges the whole edifice and its parts and details with regard to the effect to be produced, and also to conformity with the character of the building. Thus the *ordonnance* of an edifice is grand or simple, noble or commonplace, or paltry and cut up. Under this aspect the *ordonnance* of a building ought to agree not only with its size but also with its object. Thus, the *ordonnance* of such or such a vast palace is too little in accordance with its extent; or, such an *ordonnance* is too important for the small size of the building.

Ordonnance stands to *Order* (considered as a quality in architecture) as effect to cause, or as it may be said, it is order applied. As for *Order*, in the language of art in its relation to certain forms and proportions of which each species of column is the type, there are as many *ordonnances* as *orders*, and each of these *ordonnances* would bear the name of its *order*. There are thus Doric, Ionic, and Corinthian ordonnances. Not only each of the ways in which each of these orders is made use of by the architect in the plan and elevation of a building is so called, but the word is also applied to an edifice without columns, provided that its parts show spaces proportioned to the rule of such or such an order, and that the details, mouldings, and profiles, agree with the taste and character of the details peculiar to the order. Ordonner. 1. 2. 6. 25.

The French writers also translate the Latin word ordinatio as used by Vitruvius, as *ordonnance*. 25.

Ordonnance. This term is sometimes used in England to denote the employment of the orders of architecture side by side, or one over the other, in decided dissimilarity of scale or other particulars, as at the Propylæum at Athens.

ORDONNATEUR. This French title occurs among those of some architects, as "Cerceau, ordonnateur général des bastimens de sa majesté": and Androuet is styled "vray architecteur, deviseur certain et prudent ordeneur": Baptiste de Cerceau, "ordonnateur de ladicte sépulture": L. Metezeau, "architecte et ordonnateur des bastimens": Jean Bullant, "ordonnateur de ladicte sépulture": and ordonnateur de ladict œuvre"; as in Berty, *Arch. Franç.*, 8vo., Paris, 1860, p. 97, 107, 127, and 159. The term may mean chief designer and director of works in progress, and possibly includes the care of the finance. Ordinator.

ORDONNER. A French term, used in the following extracts; De l'Orme, "ordonné et conduit"; "commandé et ordonné"; "ordonné les ornements"; "commissaire ordonné et depputé par le seigneur"; and "ordonné et député par le roi; pour ordonner—desdits bastimens". P. Lescot, "l'ordonnance, la conduite, et l'execution—de ce bas-relief". Pierre Chambiges, "maistre maçon pour tous les ouvrages de maçonnerie par luy faits—par l'ordonnance de messieurs N. de Neufville—et Phil. Babou—donnée soubs leurs signets—1541": as in Berty, *Arch. Franç.*, 8vo., Paris, 1860, p. 21-9; 46; 71; and 143. This term appears to have preceded that of ordonnateur, and may therefore have a somewhat similar meaning. Ordinator.

OREA (Juan de), of Granada, was directed 22nd Oct. 1574, by the chapter of the cathedral at Seville, to examine the plans and elevations for certain works which Pedro Diaz Palacios was then executing. He was again there in 1580, when he passed through on his way to Badajoz, when he gave his approval to what had been done in the capitular hall. L. Machuca having died in 1579, king Philip II, taking in consideration "the good report which he had received of Juan de Orea, *maestro-mayor* of the cathedral of Granada, nominated him *maestro-mayor* for the continuation of the works at the Alhambra with the salary of 50,000 maravedis per annum, at which time the first story only had been completed, and the second well advanced. The king being anxious to finish this edifice, ordered Orea to come to Badajoz, where he then was, and to bring with him the old drawings, and to receive instructions (these are noticed in the life of J. de Herrera), and supplied the funds. The instructions for the completion of the palace of Charles V were very full and minute, and from the various references made to them, they seem to be chiefly based upon the designs or drawings submitted to Philip by Orea, which are expressly stated to have been six in number. By a decree of the king, dated from the Pardo, 14 November, in consequence of the death of Orea (about 1583), Luis de Minjares was appointed to succeed him at the same salary; but it is also stated, from the records of the council of the Works and Forests, that Juan de Coria succeeded him prior to the appointment of Minjares. 66.

OREBRO. The capital of the län of the same name and of the province of Nerike, in Sweden, situated on the small river Svart-Elf, at the head of lake Hjelmar. The church dedicated to S. Nicolas, is for the most part of a transition character from Romanesque to First Pointed; the west tower is perhaps later; the windows of a debased modern kind; the tradition being that the church was built about the middle of the twelfth century, by Lübeck merchants. The plan is cruciform; it is built of hewn stone with an interior of a strong cement concrete. The total length is 110½ ft., the chancel being 29½ ft., the nave 81 ft. and 21 ft. wide; the ailes each 16½ ft. An ancient but noble castle; and an old house of historical interest as the residence of Gustavus Vasa (king 1523, died 1560), are noticeable. Ecclesiologist *Journal*, 1847, vii, 189. 14. 50.

OREICHALCOS, see Orichalcum.

ORENSE (Lat. *Aquæ Urentes*). The capital of the province of the same name in the kingdom of Galicia, in Spain, situated on the river Minho, which at about half a mile distance is crossed by a picturesque bridge, built 1230 by bishop Lorenzo, and repaired 1449 by bishop Pedro de Silva; it consists of six arches with a raised causeway also partially

on arches on the southern bank: the total length is 1209 English ft. (1319 ft. Spanish) with a width of only 16 ft. 6 in. (18 ft. Spanish): the principal arch is 144 ft. English (156 ft. Span.) in clear opening, and 124 ft. (135 ft. Span.) high from the water to the top of the parapet. Orense is the see of a bishop. The cathedral, dedicated to S. Martin of Tours, was erected 550; the town was levelled 716 by the Moors; rebuilt 832 by Alonso el Casto; and the cathedral restored and brought almost into its present state 1219-20 by bishop Alonso or Lorenzo. It is small, and consists of a nave, two side ailes, transept, and chancel, with an octagonal dome or *cimborio* over the crux. The chapel of Sta. Maria de la Madre is stated by Llaguno to be of the beginning of the eleventh century; it was restored in 1722, and connected by the cloisters with the cathedral: the chapel of Santo Cristo or del Cristo Crucificado, was erected 1567, and that of S. Juan Bautista in 1468. The portal el Paraiso is enriched with statues of angels and saints. The cloisters were built 1204. The architecture of the cathedral is excessively rich and beautiful, particularly if allowance be made for the difficulty of working the granite in which it is executed—this with the elaborate detail are only found in the buildings erected perhaps one hundred years later in the north of Europe. The occurrence of the arch struck from two centres in some of the details, executed 1219, confirms the opinion of the gradual development of mediæval architecture from the south towards the north. The episcopal palace was erected 1226-52. The old circular towers of the Parroquia de la Trinidad deserve notice. A town house in the principal square, which is surrounded by paved corridors; a prison; an abattoir at the western extremity; a large cemetery on the eastern side, and a pretty theatre, constitute the other chief structures. Juan Muñoz de la Cueva, *Noticias Historicas*, 4to., Madrid, 1726. Burnell, *Orense*, in *Sessional Papers*, Royal Inst. of British Architects, 1852-3, p. 3. 28. 50. 66.

Peter Gonzalez (or Gonsalvo) commonly called S. Telmo (died 15 April 1246), is stated to have been the architect of a noble bridge over the Minho, between Rivadavia and Orense—a work, says Michele Pio, *Vite—dell' ordini di S. Domenico*, p. 1, lib. i, 1, "too great for any king, and at which he laboured with his own hands"; Milizia, from the Lusitanian historians, the Bollandists: this may relate to the bridge above mentioned.

ORGAGNA (A. and J.), see Cione (A. di).

ORGAN. (Lat. *organum;* It. *organo;* Sp. *organo;* Fr. *orgue;* Ger. *orgel.*) The name of the largest, most comprehensive, and most powerful of musical wind instruments. There are various kinds, as for a church, a concert room, a private saloon or chapel, etc., and were often termed "a pair of organs", which has been supposed to mean, not that the organ was divided, but that there were two sets of bellows used alternately. The introduction of the real organ is ascribed by some authors to the middle of the fourth century; a sculptured representation of one is to be seen on the obelisk at Constantinople erected by Theodosius, who died 395; engraved in abbé de Tersan, *Arts et Metiers des Anciens*, 1790, pl. 79. Millin, *Dict. des beaux Arts*, 8vo.; Pottier, in Willemin, *Monts. Franç.*, i, 64, and *L'Université Catholique*, i, 535, all refer to the origin of this instrument. Cassiodorus speaks of it a century later. In 757 one was sent from Constantinople as a present to Pepin king of France. An organ is represented over the west window of York cathedral, at Beverley, Exeter, Boston, and many other places; and over a doorway in Utrecht cathedral. The prints which illustrate the works of Strutt; of Burney, *History of Music;* and of Hawkins, show the clumsy nature of ancient organs. Ciampini, *de Sacris Ædificiis*, fol., Rome, 1693, pl. 16 and 57; Prætorius, *Organographie*, 4to. (1620?), pl. 26, gives different forms of the organ. Bédos de Celles, *L'Art du facteur d'Orgues*, in *Des Arts et Metiers*, fol., Paris, 1761, with 137 plates, gives ancient examples. Another ancient organ in a painting in a church at Forli, is engraved in Gori, *Thesaurus Dipt.*, ii, pl. at p. 12. Le Noir, *Mons. Franç.*, fol., Paris, 1800-3, pl. 19, shows a Byzantine painting of S. Cecilia with an organ of the ninth or tenth century. Before the Reformation in England, an organ was placed in most of the large churches, and some are stated to have had more than one. The use of this instrument was proscribed by the early Protestants; in 1644 an ordinance was passed, that no music but plain psalm singing should be allowed in divine service, and the churches were nearly all stripped of their instruments.

Spark, *Choirs and Organs*, read before the Yorkshire Arch. Society, May 1852; Builder *Journal*, x, 652; and published 8vo., Lond., 1852. Seidel, *The Organ and its Construction*, 8vo., London, 1852, translated from the German, 8vo., Breslau, 1844; and reviewed in the Athenæum *Journal*, 1854, p. 776. Hopkins and Rimbault, *The Organ, its History and Construction; with memoirs of builders*, 8vo., Lond., 1855; 1870, new edit. Baron, *Scudamore Organs*, 8vo., Lond., 1858; 2nd edit., 1862. Rimbault, *Early English Organ Builders, from XV cent.*, 8vo., Lond. (1865). Mason, *English Church Music*, 1868. Bishop, *Notes on Church Organs, their position, etc.*, 8vo., Lond., 1873. Builder *Journal*, 1855, xiii, 625; xiv, 3; xvii, 437 describing the organ at All Saints' church, Margaret Street, 1859: also xxvii, 837; xxxi, 131. Daly, *De l'Orgue et de son architecture*, in the *Revue Générale*, 1856, xiv, 247-271. Lenoir de La Fage, *Manuel complet de musique vocale et instrumentale*, in Roret, *Encyc.*, 18mo., Paris, 1836-39. Regnier, *L'orgue, sa connaissance, son administration, et son jeu*, 8vo., Nancy, 1850; 1862, 2nd edit. Bonnart, *Costumes du Moyen Age*, i, pl. 69; and Rigollot, *Arts en Picardie*, pl. 23, give illustrations of a small organ suspended from the neck of a young musician. Ecclesiologist *Journal*, 1843, iii, 1; and iv, 4-9: also 1854, xv, 97-101, being Dryden, *On Church Music*, etc., as read before the Architectural Society of the Archdeaconry of Northampton, and printed in Associated Societies, *Reports and Papers*, 8vo., 1853, ii, 179-264. *Organs for Village Churches*, Builder *Journal*, 1859, xvii, 11. The contract, dated 20th March 1632, for the organ at York cathedral, is given in Surtees Society, *York Fabric Rolls*, 8vo., Durham, 1859, p. 319. Crystal Palace Company, *Report* of a committee on the construction of an organ, 1854; reviewed in Literary Gazette *Journal*, No. 1926, p. 1219. Micklethwaite, *Modern Parish Churches*, 8vo., Lond., 1874. Chappell, *History of Music*, etc., 8vo., London, 1874.

ORGAN, position of the. At Canterbury cathedral there were galleries in the transepts, and the organ was placed in the one in the south transept (Gervase); after the fire of 1174, it was placed upon a large corbel over the arch of S. Michael's chapel in the same transept. About 1780 it stood on the north side of the choir between the third and fourth pillars; and was subsequently placed over the screen dividing the nave from the choir, in which position, after the Restoration, in cathedrals and large churches it was usually placed, and where it unfavourably, it is considered, interrupted the perspective effect of the vaulting from one end of the building to the other. A long contention arose between the dean and chapter of S. Paul's cathedral and Sir C. Wren, as to the position for the organ in that building, the latter maintaining it should be placed on one side of the choir, so as not to impede the view of the building, the former insisting on its being erected at the west end of the choir, where it was ultimately placed, and remained until after 1851, when it was removed to a new position, which is now on the two sides at the entrance of the chancel or choir. At Winchester cathedral, the organ, originally placed on the screen but removed by order of Charles I to the north side of the choir, was placed *cir.* 1830 in a gallery beneath the north arch of the central tower. Much difference of opinion then prevailed amongst antiquaries respecting the usual and proper place for

the organ, and several essays were written; and again on the occasion of the proposed removal of the organ at York cathedral, after the fire of 1829: it had been placed 1632 on the north side of the choir, but in 1690 was removed and fixed over the choir screen. At Durham, which formerly had a large organ placed on the rood loft, and at Lincoln, it was placed on the north side of the choir.

"Precedent does not very much assist in determining the position of the organ, because the great increase in the size of the instrument (which is the cause of the difficulty) is of a comparatively late date. In England, Old S. Paul's and Westminster, as Winchester now, had their organs above the stalls, north of the choir. In France and the Low Countries, the west end is the more common position, with a smaller organ (as at Sens and Paris) in the choir. In Italy, there are often two of moderate size, one on each side of the choir; as at the duomo at Verona, S. Mark's at Venice, and Florence (where they are at the north-east and south-east of the octagon), and at Milan. In S. Peter's they are movable, on wheels. In S. Antonio at Padua there are four, two on each side of the choir. At Ratisbon the organ is concealed behind the high altar: at Treves there is a small organ north of the choir, and a full one at the west end, where in Germany it appears to be the most common situation, particularly in new churches. The custom of placing the organ on the screen has obtained with us only since the restoration..... We cannot but think it much better to have a small organ in the rood loft, or better still, north of the choir, and the full organ in the most convenient place that can be found in the other parts of the church;" Ecclesiologist *Journal*, 1844, iv, 9.

On the continent, the large organs are invariably placed in lofts or galleries, some at the west end, some over the doors, and some against a pier, at Strasburg it projects from the triforium, blocking up part of the clearstory window. The church of S. John at Bologna, has two large organs, one being on each side of the choir; it is usually so in France and Germany, but not so common in Italy; in the Frauenkirche, at Dresden, it is placed over the communion table. At Chartres, it is in a small wood gallery projecting from the triforium on the south side of the nave, and it covers the whole of the upper part of one bay of the nave.

The usual position assigned to the organ in ordinary churches in England, for the last 300 years, has been at the west end in a gallery, whereby the entire area of the church has the benefit of the whole united body of sound thrown forward without impediment. But where, as of late years, there is a choir, and it is insisted that the choristers shall be surpliced and placed in the chancel, the west end is too remote a position for the instrument. A rare arrangement is that of dividing the organ, and placing a portion of it on each side of the chancel, where that may be possible, as at S. Margaret's, Leicester; at All Saints', Margaret Street; at S. Mary's Redcliffe, Bristol; and lately at S. Paul's cathedral, London. In Westminster abbey, the organ is divided into four portions. At Ely it is a hanging one, the organist sitting over the aile, at the back as it were of the instrument. Hopkins recommends placing the organist *at the side* of the instrument, as at Beverley minster, where the organ, standing on the choir screen, has the keys on the north side. In the intended (1873) Edinburgh cathedral, it was proposed to divide the organ into pieces, and place them up and down in the triforium and choir ailes; the choir organ and the organist being placed close to the first bay on the north of the choir: Builder *Journal*, 1873, xxxi, 131.

An organ worked by electricity was patented by Barker of Paris before 1866, and has been erected in the church of S. Augustin at Paris, and at Salon near Marseilles. The largest organs may now be played through a cable of insulated wires, thus positions hitherto impracticable can be turned to good account; and the organist can be placed in any direction and at any distance away from the instrument; Builder *Journal*, 1868, xxvi, 160: 1866, xxiv, 230.

The organ is now usually, if not always, in restorations and in new churches in England, relegated to the *north* side of the choir when placed in or close to the chancel. Choirs are not intended to sing to, or for, but with, the congregation; the position of the instrument therefore requires to be such as will best conduce to bring about this, the main object of their services. When the congregation is not assembled in the choir as in cathedrals, it is doubtful whether the chancel is a proper position for the choir. The organ should not be concealed from view, nor its tones smothered under a low arch, nor be fixed in a damp place. "Under present circumstances", writes "F. H. S.", in the Church Builder *Journal*, 1867, p. 165 (also 1868, p. 126), "the best position for the organ is, without doubt, at the eastern end of the choir sittings. It would, thus arranged, generally occupy the centre of the chancel wall, north or south, and might project from one or two feet into the chancel—but the less it projects the better". (A plan is added, the back of the organ forming part of a vestry, and forming a chamber.) "In Wurtemburg and other parts of Germany, this is the common situation for the organ in small churches, and it is found to answer extremely well. At times it may be needful to place the organ at the east end of an aile, but then the organist is too far from the singers, who should always be seated in the chancel, if possible.—Chancels with ailes of course offer great facilities to the organ designer, if the arches are of sufficient height." Sutton, *Church Organs, their Position and Construction*, fol., London, 1872, with plates. Denison, *Church Building*, 8vo., London, 1856, p. 262-6. *Organs in Cathedrals*, Builder *Journal*, 1870, xxviii, 523, 555, 589, 611.

ORGAN CASE. The framing in which the pipes and keys are arranged and fixed; this with the pipes and their decoration becomes an element of architectural design. The following publications comprise various examples, ancient and modern. Sutton, *Account of Mediæval Organ case still existing at Old Radnor, South Wales*, 1866; and second edition, *Church Organs*, fol., Lond., 1872, showing various sized instruments; and Church Builder *Journal*, 1868, p. 127-31. Viollet-le-Duc, *Dict.*, gives that at Perpignan cathedral, also given in Nodier and Taylor, *Voyage Pitt.* (Languedoc), fol., Paris, 1833-37, ii, pt. 1; and that in the church of Hombleux in Picardy, both dating early in the sixteenth century. A Renaissance example at La Chaise Dieu is given in Nodier and Taylor, *Voy. Pitt.* (Auvergne), fol., Paris, 1829-33, ii, 42, pl. 147. Gailhabaud, *Monumens*, etc., 4to., Paris, 1850, iii; and the Moyen Age Monumental, pl. 209, illustrate the organ at Strasbourg. Gailhabaud, *L'Arch.*, etc., 4to., Paris, 1858, iv, gives two coloured plates of an example at Gonesse. The famous organ at Haarlem is given in the Penny Magazine, 1834; and also in the Building News *Journal*, 1869, xvii, 424, 453. Daly, *Revue Générale*, 1856, xiv, 247, pl. 22-4 shows the organ in the cathedral of S. Brieuc; and 1872, xxix, 110, pl. 21-4, the chamber organ at — Hopwood's in England, by A. Cavaillé-Coll, of Paris. The Builder *Journal*, xviii, 1860, p. 449, gives the organ case at Shadwell Court, Norfolk, for sir R. J. Buxton, designed by S. S. Teulon. One of the 14th or 15th century in the church of S. Nicolas at Zerbst, in Saxony, is given in Puttrich, *Denkmale der Baukunst*, fol., Leipzig, 1835, pl. 2: also a fine one in the church of S. Jacques at Liège. An organ of the sixteenth century, in the church of Sta. Maria de' Monte, at Rome, is shewn in Letarouilly, *Rome Moderne*, fol., Paris, 1843, pl. xxvii. Webb, *Continental Ecclesiology*, 8vo., Lond., 1848, notices three organs in Italy. Willemin, *Monumens Français*, fol., 1806-32, i, pl. 106, 133, 148, and 193, gives many forms of organs. Denison, *Church Building*, 8vo., Lond., 1856, p. 262-6.

The magnificent organ in the church of S. Mary, at Lübeck

(Illustrations), may be presumed to have been built in 1518, the time when most of its gorgeous embellishment was added. Meister Barthold is named as its constructor. The ornamental case, *i.e.* the part at the bottom of the small organ (pl. 92), was added 1640. In 1706 the whole church was repaired, and the *senatores*, who directed the works, placed their coats of arms below the organ and case; of these five coats, only one (that of Fuechting, at the top of pl. 77) belongs to the year 1640. The height of the vault of the church is about 123 ft. from the pavement. On each side of the organ are two very large pipes belonging to it, and fixed to the nearest pillars; the dotted lines on the left hand of the plate show how much of the organ is concealed by their projection. The position of the detail given in pl. 78 will easily be recognised by the angel and the figure (probably meant for the monk Guido, as it does not seem to be one of the saints). The coat of the town of Lubeck affords the means of indicating the situation of the detail given in pl. 91; and the contents of pl. 92 consist, beside the centre part of the small organ, of the figure of king David, the panel between the two half-length figures, and of the ornament at the base of the large organ. KING, *Study Book*, 4to., London, 1868, iv, gives the organ in the church of S. Peter's at Lübeck.

ORGAN CHAMBER. "An organ, the most beautiful of instruments when in tune, is one of the most disagreeble when neglected; and every architect should know how sensitive it is to draughts and damp, in order to guard against these in his arrangements for the reception of the instrument. If there be a choir, the organ should be placed close to them, and the proper place for it is either in a side aile of the chancel, or in an organ chamber, built expressly for it, which is better. The effect of the instrument will be much enhanced, and it will be kept in better tune, if the walls are lined with boarding on battens; and if not placed in a gallery, it should always be raised on a platform some feet from the floor. The worst place for the organ on every account is in the west gallery, if there be one; and I believe organs are never now placed there in new churches. Of course I do not contemplate in these days the possibility of an organ appearing over the altar. In small village churches, where an organ can seldom be tuned, I think an harmonium is much preferable"; BLOMFIELD, *Arrangement of Churches*, in BUILDER *Journal*, 1861, xix, 7.

"We never see one of the *organ chambers*, which it is the fashion to build on the north and south side of the chancel of our modern churches, without wondering whether it is not a very serious blunder. It is, no doubt, a convenient position with respect to the choir; it is difficult to assign any other satisfactory position in a church; but *can* it be right to push the organ away into a chamber just large enough to contain it, with only two sides open into the church? It may suit the clergyman—and the architect—but does it suit the organ builder and the organ?" CHURCH BUILDER *Journal*, 1873, p. 68. An organ chamber built out from the side is badly placed, and fixing the instrument in a recess is worse. When it is placed in a chancel chapel, or at the east end of an aile, the arch into the chancel and into the aile should be well open.

"With a new organ chamber, the first care should be to ascertain what sized instrument it is to be built for; and whether 4 ft., 8 ft., or 16 ft. stops are to be used; the chamber should then be designed amply large enough, and as open as possible, and the arch leading into the chancel as wide and high as the whole chamber, so as to allow the sound to come out properly"; CHURCH BUILDER *Journal*, 1867, p. 165; also 1868, p. 126.

It has been stated that if an organ be opened quite freely through its whole front, it does not matter in the least how low the ceiling of the organ recess may be: and that it has been proved, experimentally, that there is no difference in the sound, provided the front be clear, whether there is a flat ceiling directly over the organ or not.

ORGAN LOFT. The gallery in which an organ is placed.

ORGAN SCREEN. After the Reformation, when the organ was reintroduced into churches, it was not replaced on one side of the choir as previously, but was fixed over the rood screen in cathedrals; hence the rood screen became the organ screen. JUBÉ. ROOD-SCREEN.

ORGANI (GIORGIO DEGLI) son of Filippino, was employed from 27th Sept., 1450, on the works at Milan cathedral. 27.

ORGYIA or Egyptian yard. It was a hundredth part of the stadium, and measured 5·345 ft. French, according to SILBERMANN in 1859; JOMARD while in Egypt with the French Commission calculated it at 6·058 ft. calculated from an average height of men, as printed in *Système Métrique des Egyptiens*, 8vo., Paris, 1809, i, 495-801. The Grecian Orgyia or pace, derived from the distance between the extremities of the outstretched arms of a human body, is given as 6 ft. 0·525 ins. English (GWILT, *Encyc.*, Glossary); and as 6 ft. 0·81 in., and 6 ft. or 4 cubits, in SMITH, *Dict. of Antiq.* The Russian orgyiæ or fathom or sagine, is equal to 7 ft. English.

ORIA or URITANA (Lat. *Hyria* or *Orra*). A town in the province of Otranto in Southern Italy: having a mediæval castle built by Frederick II *cir.* 1225, and now a nunnery. The cathedral dedicated in the name of the Assumption is modern; there are also three parish churches. 28. 50. 96.

ORICHALCUM and Auricalcum. A mixed metal (considered as the equivalent of the modern brass) used by the ancients, being composed of copper and calamine (carbonate of zinc); STRABO, xiii, 606; TEXIER, *Asie Mineure*, fol., Paris, 1839-49, ii, 195. The natural *oreichalcos* of the ancients was a rare substance, esteemed almost equal to gold itself; SMITH, *Dict. of Antiq., s.v.* Metallum, 760 b. and 761. 6. 80.

ORIEL. A particular sort of window. The origin of the term has not been satisfactorily determined. If not derived from the Saxon Ehpyrl, an eye-hole, a window; and Saxon, feh-ehÿpl, in TURNER, *Hist. of the Anglo-Saxons*, iii, 436, note, reference should be made by the student to NOTES AND QUERIES *Journal*, especially Series iv, which appears to comprise the chief quotations. HAMPER, in the ARCHÆOLOGIA, 4to., London, 1830, xxiii, 106-16, gives six applications of the word, which are considered in the GLOSSARY as referable either to oriels jutting out, or to chambers probably deriving their name from such a projection. An instance of the early use of the word occurs in the "Squyr of Lowe Degrè", an old poem published in RITSON, *Metrical Romances*, "In her oryall there she was, closed well with royall glas"; GENTLEMAN'S MAGAZINE, 1824, pt. i, 7. AUBREY, 1638, says, "They always ate in their Gothic halls at the high table or oreille (which is a little room at the upper end of the hall, where stands a table) with the folks at the side table. ANTIQUARIAN REPERTORY, 1807, i, 71. TURNER and PARKER, *Domestic Architecture*, 8vo., Lond., 1851-3, state, "In the thirteenth century is first found mention of oriels, of which the precise character is not known; no example remaining of the period at all like that which is now so called" (i, 73). They give (ii, 82-6) several uses of the word *oriol* from the Liberate Rolls of 17th to 44th years of Henry III (1232-60), deciding that it was "an upper room, frequently forming a sort of landing place, or waiting room, outside the door of the principal chamber": and notice among other references, the PROMPT. PARV., a Lexicon Anglo-Latini, A.D. 1440, which explains the "oryel of a wyndowe" by "*cancellus, intendicula*". They describe (ii, 88) an example of the 13th century at Prudhoe castle, Northumberland; "the solar in the gatehouse has a bay or oriel corbelled out at one end.—This building affords the earliest instance we have met with of that class of windows now popularly known by the name of an oriel window;" (a plan, with inside and outside views, is given, p. 206). They (iii, 184) say, "the origin of the oriel window was a recess for the altar of an oratory or small chapel, corbelled out from the face of the wall in order to give more space, as at Prudhoe castle".

ORGAN



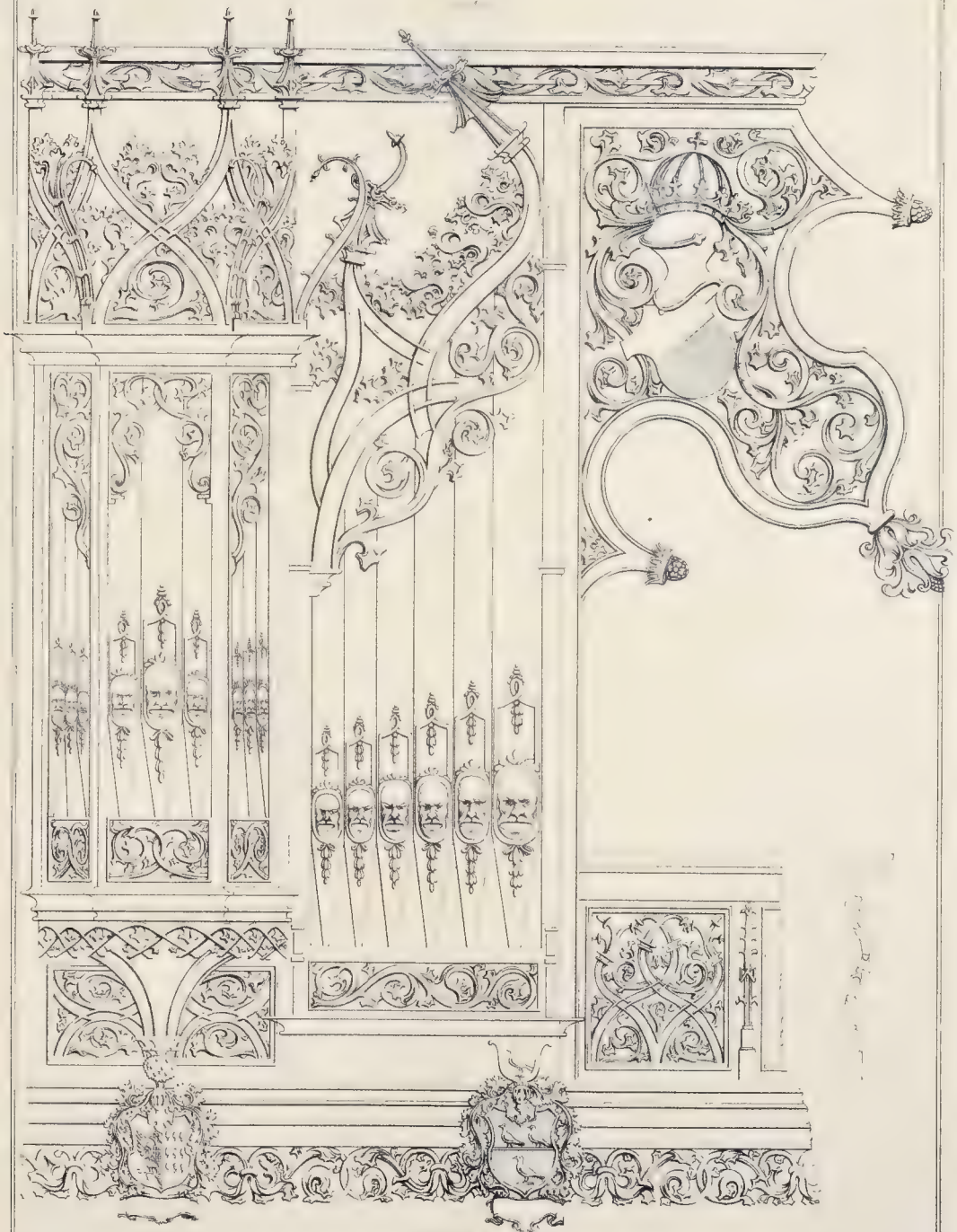
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Details of Organ at
ST MARY'S CHURCH.
LUBECK
1518

J. Gwilt

ORGAN



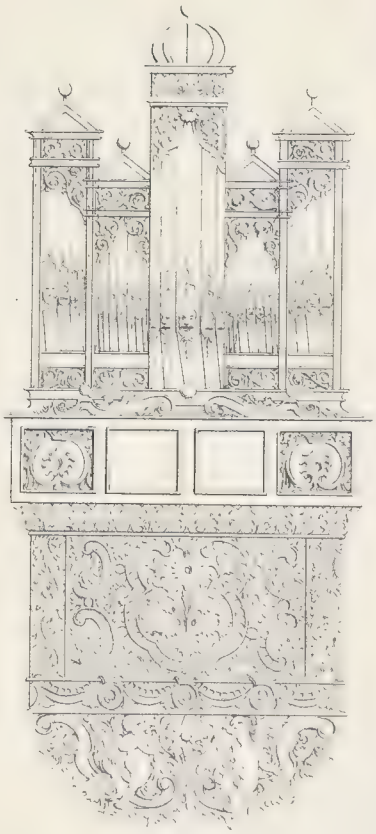
St. MARY'S CHURCH.
LUBECK.

Printed by Hullmandel & Walton Nov.r 1st 1852

ORGAN

SCALE 4









S^t Marys Church

LUBECK.

In the prior's house at Wenlock (15th cent.), the altar stands in the recess of the bay window, the chapel or sacrarium being on the ground floor: and (iii, 185) again write "In the 15th century, the oriel became much more common, and was so frequently destined for other purposes that its original use seems to have been lost sight of.—The oriel was placed over gateways, and it became so general that some other origin besides that of the oratory has been sought for, and some antiquarians are of opinion that it had its origin in the machicoulis or bartizans of military architecture, which were generally used over the gateway in order to protect it from assailants; and this sort of projecting closet, when glazed in more peaceful times, assumed the form of the oriel window." 14. 16. 17. 19.

The term is now more usually applied to that particular kind of window, which projects from the upper story of a building (jutting window), being suspended over the face of the wall beneath it (Ger. *erker-fenster; chor-fenster;* Belgian, *tribune*); but the term also includes the BAY-WINDOW itself, rising from the floor of the room, as a dining hall, and also of a pentagonal form and divided by mullions and transoms into bays or days. MILNER, *History of Winchester*, 4to., Lond., 1809, ii, 283, properly distinguishes between the two sorts.

The writer of the article "Oriel", in the PENNY CYCLOPÆDIA, suggests the use of the term "corbel stool" or "corbel base" for the supporting portion, which generally consists of a series of mouldings; of "window apron" or parapet with the lights, as the body of the oriel; and of the "crown" or roofing, including the ornamental finish above the lights when that happens to form a conspicuous termination to the design.

The oriel chiefly occurs in England in Tudor architecture, in the domestic and collegiate Gothic, being very rare in ecclesiastical structures. Among examples of the oriel are:—

1390 Lincoln, John of Gaunt's palace (BRITTON, *Specimens*, pl. xlii); it was sold in 1849 to earl Brownlow, and is now preserved in the castle.
Wells, Vicar's Close (PUGIN, *Examples*).
Blarney castle, Ireland.
At Oxford, in Baliol (MACKENZIE, pl. 32), Magdalen, Lincoln, All Souls', S. John's (pl. 33), and other colleges.
Great Chalfield manor house, Wiltshire (WALKER).
1382 Thornton abbey, Lincolnshire (PARKER).
14th Lincoln, Cantilupe Chantry house, near the bishop's palace, 1355 or 1366 (PARKER, ii, 239), it lights an upper story.
15th Berkeley castle, Gloucestershire, a timber oriel, projecting from the gallery (PARKER, iii, 178).
„ Sherborne, Dorsetshire, rebuilt into a modern house (PARKER).
„ Clifton Maybank, Dorsetshire, in the gable end of the upper story.
Canterbury cathedral in the south-east transept.
Worcester cathedral, in north aile of choir (BRITTON, pl. 11). The sacristans' oriel still remains at Worcester; WALCOTT, *Cleeve Abbey*, in *Sessional Papers*, Royal Inst. of British Architects, 1875-76, p. 109.
16th Agecroft hall, Lancashire, of timber (PARKER).
„ S. Bartholomew, London: an oriel projecting from one of the triforium arches (CIVIL ENGINEER, etc., *Journal*, 1843, vi, 379).
„ Cirencester church, Gloucestershire; three, each in two heights, to the south porch (NEALE).

On the continent:—Examples of the 12th cent. occur in the castle of Landsberg, near Barr in Alsace; and of 13th cent. in a house at Gondorf, in the Moselle. At Nuernberg, of 14th cent. including that in the pfarrhof of S. Sebald, extolled by Dr. Dibdin for its bas-relief panels (HEIDELOFF, *Baudenkmale der Vorzeit;* (BUILDER *Journal*, 1850, viii, 139). Another similar in the Schönebrunnen in the market place, 1360. At Bruges, one of oak in Nôtre Dame: and one in red brick at the house of the executioner, in the rue Flamande. At Cologne, in the church of S. Mary in the capitol, an altar is corbelled out in an oriel at the end of each aile by the side of the chancel, in order to give room in the side chapels.

The part of a monastery in which monks slightly indisposed were allowed to remain, was termed an oriel, according to FOSBROKE and also FULLER. John de Hertford, abbot of S. Albans (1235-60) built a "porticus vel oriolum" to the guests' hall (BUCKLER, 162): and the alder tree, by the compiler of the "Promptorium Parvulorum", Harl. MS. 221, is called the "oryell tre".

ORIENTAL ALABASTER. The quarries of this ancient material, re-discovered about 1837, are situated in the Wadee Om Argoub, a valley south of the road from Benisooef to the monasteries of SS. Anthony and Paul in the Eastern desert; WILKINSON, *Handbook*, 12mo., London, 1847, p. 269. It has been used to ornament the new mosque of the citadel at Cairo and other works. Another quarry is said to exist in the mountains north-east of Kom-el Ahmar, supposed by WILKINSON, 292, to be the *Alabastron;* and another behind the western face of the hills at Tel el Amaara, both between Minieh and Oscrot; p. 306: which is supposed to be the *Alabastron* of Pliny and Ptolemy. ALABASTER or ALABASTRITES. LIMESTONE.

ORIENTATION. That arrangement of a sacred building by which a worshipper faces the east when at prayers, or while making his offerings. The term includes, necessarily, an account of other arrangements. VITRUVIUS, iv, 8 (9 in some edits.), directs that "the aspect of altars should be to the *east*"; but, iv, 5, that "the statue in its cell should have its face towards the *west*, so that those who enter to sacrifice or to make offerings may have their faces to the east as well as to the statue in the temple. Thus suppliants, and those performing their vows, seem to have the temple, the east, and the deity, as it were, looking on them at the same moment. But if the nature of the place do not permit this, the temple should be turned as much as possible, so that the greater part of the city may be seen from it. If temples be built on the banks of a river, as those in Egypt on the Nile, they should face the river; so also, if erected by the road side, they should be placed in such a manner, that those passing by may look towards them and make their obeisance." All nations have thought it expedient to fix upon some point of the horizon towards which the suppliant should turn in prayer. The heathen worshipper turned towards the east, the rising sun; the Jew, wherever abiding, always turns towards Jerusalem; the disciple of Mahomet towards the city of Mecca; the Christian complies with the ancient practice, although it be heathen, and makes the east the point of his worship.

In remote antiquity in Greece, the altar stood alone, and was square facing the cardinal points, or circular; in the morning the priest standing behind it and offering sacrifice faced the east. Later on, altars were built of stone and statues were made, and as these latter gradually assumed importance in the popular idea, they required to be sheltered, and hence the erection of temples; but as the statues were the images of the gods, and not the gods themselves, public worship was still addressed to the latter, at the altar in front of the temple. Thus the altar continued to be the central point of worship, and the temple was built *west* of the altar, so that its principal front and the statue looked towards the rising sun. (A. C.)

It may be inferred from EXODUS, xxvii, 13, and EZEKIEL, viii, 16, that the tabernacle door faced the *east*. "Almost all temples have their entrances and statues facing the *east*, so that persons entering look towards the *west*, and stand with their faces directed towards the west when they offer honours and reverence to the gods;" PORPHYRY, *De Antr. Nymph.*, p. 251. "The temples of the ancients usually received the rising sun, so that as soon as the door was opened, they were filled with light" (entering from the *east*); temple doors placed towards the rising sun: DIONYSIUS of Thrace, lib. iii, *Dicæres.* On the contrary—"The most ancient of the temples looked towards the *west*, so that persons standing before the images might be taught to turn towards the rise"; CLEMENS ALEXANDRINUS, *Stromat.*, lib. vii, p. 724. "The ancient architects recorded rightly that temples fronted towards the *west*, but in after times it was the pleasure of the world that every religious rite should be directed towards that quarter of the heavens from

which light comes upon the earth"; HYGINUS, *de Agror. limit.*, p. 93. "Delubra in occidentem recte spectare scripserunt;" FRONTINUS, *De Limitibus*, Frag. 1. "It seems from the words of the Alexandrian father, that only the temples of ages long anterior to his time were constructed with the entrances facing the *west*, and that the position of the temple seems to have become in his days a matter altogether of indifference": and "It caused the entrances of temples and the faces of idols to be turned *from the west*, as in the earliest times, *to the east* as in later ages, when idolatry had so far advanced as to adopt the use of images bearing the human form"; DUDLEY, *Naology*, p. 406-7.

The directions above given by VITRUVIUS, iv, 5, must apply to a period later than that of the erection of the majority of the Greek temples, which nearly all face the *east*, as does the statue, and where the altar is in the open air, it is to the east of the temple. At Athens, on the Acropolis, the site of the altar of Athene is eastwards of the east front of the Parthenon, and in the line of the axis of the temple. BURNOUF, *La Légende Athénienne*, 8vo., Paris, 1872, p. 61-66, attempts to account for the new Parthenon not having been erected on the same foundations as the old, but a little more to the north, by a calculation of the change of position of the Aurora, in relation to the altar and the temple, and with reference to certain natural features, which would arise from the variation of the obliquity of the ecliptic in the interval between the foundation of the old Parthenon and the erection of the new temple by Pericles, 445 B.C. This calculation would fix the date of the old Parthenon as 554 B.C., the time of Peisistratus, as is generally determined for it on other grounds. (A. C.)

In so few publications are the points of the compass placed upon the plates, that only the following buildings named in this *article* could be noticed out of the many plans to which reference has been made. The temple to Theseus, and to Minerva Polias, both at Athens; and that to Zeus at Olympia, had their entrances to the *east*, as had the temples at Ægina; at Sunium; at Jackly near Mylasa; the Corinthian temple at Cnidus; that to Apollo Didymæus near Miletus; and that at Labranda. The temple to Minerva Polias at Priene appears to have had entrances at both ends, east and west. At Ægeste the great ruin must have had its altar facing east, *i.e.*, the door to the *west*; at Pæstum, the altars to Neptune and to Ceres looked *east*; at Agrigentum, the supposed entrance to the temple of Jupiter Olympius was at the *west* end, because there were six columns, and at the east end seven; according to the plan given in FASO PIETRA SANTA (duca di Serradifalco), *Antichità della Sicilia*, fol., Palermo, 1834-42; and as stated in STARKE, *Travels*, 8vo., 1839, p. 337-8; 405: COCKERELL, however, in his plan, shows seven columns at both ends, and no tradition exists as to the position of the entrances; he states that the entrance to the other (seven) temples there were at the *east* end. The temple at Cadachio faced east-south-east: and at Eleusis, the temple to Nemesis faced 15 deg. south of east, as did that to Ceres, while the later temple to Themis (as supposed), built close to the first named temple, faced almost, if not exactly, eastward. The temple at Bassæ near Phigaleia is placed nearly north and south, with the principal entrance to the north, and another on the east side, in the rear of the central column, as noticed by COCKERELL, *The Temples*, etc., fol., Lond., 1860, p. 47, who adds, "that the temple of the Sun at Palmyra was so placed, with four entrances to the east, the principal one 32 ft. high by 15 ft. wide; with five doorways to the west; an arrangement probably demanded by some peculiarities of the ritual belonging to it." The ancient Roman practice appears to have been that of placing the entrance to the east, as in Syria and elsewhere.

The doors of ancient Greek tombs are placed generally facing the north; that to Theron at Agrigentum is, however, to the south; STARKE, *Travels*, 1839, p. 404.

In Egypt, there appears to be no general law as to the position of temples with respect to the cardinal points of the compass, but in very many cases the main front is turned towards the river, and therefore generally facing the east or west, more or less. The DESCRIPTION DE L'EGYPTE gives the number of degrees each temple declines from the magnetic north. The faces of the two great pyramids at Geezeh are parallel with the cardinal points, and the others more or less so; the entrance to the great pyramid is on the north side. Pococke states that the two colossal statues at Western Thebes face the south-south-east. Belzoni saw eight mummies lying in their original position, and facing the east. The temple at Memphis had four entrances facing the cardinal points. The palace temple at Karnak faces the river towards the north-west, the small one north-east. The temple at Luxor has three inclinations, the sides being towards the river, the fronts being more or less north-easterly. At Edfoo, to the south; and to the south of the temple is a smaller one facing the east. Denderah is to the east. At Philæ the temple inclines with the river, having the front to the south. At Kalabsheh, the front is perhaps easterly and faces the river. At Thebes, the Ramesium or Memnonium faces the river towards the south-east: as do the temples at Medeenet Haboo, the Memnonium or tomb of Osymandyas, and at Goorneh, all on the west side of the Nile. The two temples at Esneh are to the east and to the river; that at Koom Ombos is south-west and to the river; and that at Erment is to the west and inclined to the river. In Nubia, the temple at Soleb faces the east; while the two at Mount Barkal face a little south-east. The rock-cut temple at Aboo Simbel faces the river and the east, so that the rays of the rising sun passing through the entrance falls upon the face of the statue placed within it at a distance of about 150 ft. from the entrance.

The general arrangement of the Christian churches differs only in appearance from that of the Greek temples: in the latter, the people, the altar, and the priest, were outside the temple, and turned to the east; in the former the temple contains all; and the altar, the seat of the deity, being at the east, priest and people all turn to the east. Socrates, in EUSEB., lib. x, c. iv, tot., says, in the church at Antioch the altar looked west (*i. e.*, entrance at the *east* end): Paulinus of Nola (Ep. xxxii, *ad Sever.*) says the same of one of his own structures; and the temple of Paulinus of Tyre seems to have stood the same way, for EUSEBIUS describes the entrance as fronting the rising sun. Though the author of the Constitutions (*Apost.*, lib. ii, c. 57, 62) directs the churches to be built towards the east, yet it appears that the practice was not so universal, but that it admitted of exceptions, as necessity or expediency required; as observed by Usher, *Letters*, xlix, and cardinal Bona (*Rer. Liturg.*, lib. i, c. 20, n. iv), and Walafridus Strabo long before (*de Reb. Eccles.*, c. 4), who says, the ancients were not nicely curious which way their churches stood; but yet the most usual custom was for Christians to pray toward the east, and therefore the greatest part of the churches were built with a respect to that custom.—S. Patrick built a church in Sabul, hard by Down, in Ulster, placed north to south (USHER, *Letters*, xlix): BINGHAM, *Origines*, 8vo., Lond., 1840, ii, 392.

Among other ancient churches facing the east was that at Lyons, built by bishop Patiens and destroyed by the Arabs, according to SIDONIUS APOLLINARIS: S. Mary at Antioch; SOCR., *Hist. Eccles.*, v., ch. 22: and that at Tyre, both built by Constantine; his basilica also at Jerusalem, both described by EUSEBIUS; where three great gates faced the east, the central being the loftiest, the arrangement being that of the Jewish temple. DURANDUS, *Rationale*, 8vo., Leeds, 1843, chapter i, section 8, directs (p. 21 and p. 214, Appendix), "Let the head of the church point to the east, and in that point of the heavens where the sun rises at the equinoxes, that it may signify to the church militant the obligation to behave itself with moderation both in prosperity and adversity; and not to the solstices, which is the practice of some." In some instances the line of the structure was directed to that point at

which the sun rises on the day of the commemoration of the saint to whom the church might be dedicated; but this rule might imply saint worship; Dudley, *Naology*, 8vo., London, 1846, p. 523. Serlio, *Architettura*, folio, Venice, 1663, p. 368, notices the ancient practice of placing the altar to the east, and states that it was not regarded as necessary by Christians. "It is an ancient custom and approved tradition, according to the Council of Milan", states Walcott, *Sacred Arch.*, 8vo., London, 1868, p. 416. "According to the universal tradition of the church, writes Blas Ortiz, forgetting apparently that this is no tradition of the Roman Church", writes Street, *Gothic Arch. in Spain*, 8vo., London, 1865, p. 234.

The founders of monasteries conformed to the rule of placing the sanctuary to the east; when one was erected in the open country, the gate was placed opposite the front of the church, but when near a town or upon an old line of road which could not be diverted, the gate was placed in the most convenient position in regard of the town. Orientation was in this respect the same in mountainous countries and in islands, where it was necessary to place the door of the abbey towards an accessible point, without regard to its relative position with the church; Daly, *Revue Générale*, 1851, ix, 383-4. Also i, 322; v, 242; and xviii, 31.

The orientation of S. Peter's, and other basilican churches at Rome, is identical in principle with that of the Greek temples; and these churches are probably the successors of ancient temples or basilicas, whose position and aspect had been determined by principles similar to those above mentioned, and the object of worship being changed the ritual of their orientation appears to differ from that ordinarily adopted. Paulinus of Nola, *Epist.* xxxii, adverting to a newly built basilica, says, "Prospectus vero basilicæ non, ut usitatior mos est, orientem spectat, sed, etc." (A. C.)

Thus in the churches of the sixth century at Rome, as S. Pietro, Sta. Maria Maggiore, Sta. Cecilia, S. Giovanni Laterano, SS. Quatuor Coronati, S. Clemente, S. Crisogono, etc., the altars are at the *west* end; as they were originally in those of S. Paolo and of S. Lorenzo. Those in SS. Giovanni e Paolo, S. Pietro ad Vincoli, Sta. Sabina, S. Ribrario, etc., are at the *east* end (Basilica, p. 38). As the front of S. Peter's at Rome faced the east, the people, even in the fifth century, used to stand on the upper steps and bow to the rising sun; this custom being continued, to avoid any suspicion of superstition, in the time of Boniface VIII (1294-1303) a mosaic of the ship of Christ was erected, towards which devotions were to be made; Urban VIII(1623-44) placed it over the outer great door (Walcott, *Sacred Arch.*). Webb, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 480-6, gives the names of twelve churches in Rome, orientating nearly east; five more decidedly south-east, two north-west: six in a westerly direction; eleven north-west; two south-west; three north; and two to the south. Comparing the orientation of the altars of twenty-seven churches with that of the churches — in seven they are both eastward; in two they are both to the north-west. In eighteen, the altar faces the opposite way to the church, so that the celebrant stands with his face to the people and back to the apse; thirteen of these churches have a western orientation; two a northern, the altars facing the south, and in three the orientation being truly to the east, the altars face due west. The church of Sta. Maria Novella at Florence is built north and south.

Orientation is not much regarded in modern Romish churches; Poole. S. George's R. C. church, Westminster Road, is placed west and east by A. W. Pugin, and his church at Derby is faulty in arrangement. Dublin Review, May 1841; Ecclesiologist *Journal*, 1849, ix, 153. Pugin, *On Chancel Screens*, 1851, p. 23, 27; back of altars to nave.

The Byzantine churches in Greece had their entrances at the *west* end; and Couchaud, *Choix d'Eglises Byzantines en Grèce*, fol., Paris, 1842, p. 11, notices that the priest standing at the altar looked eastward, and that in the apse is always a small narrow window only a few feet from the ground; "this orientation", he adds, "is the reverse of that of the pagan temples". A similar window existed in the apse of the capella Palatina at Palermo: but many years ago this was closed up, a mosaic of the Virgin occupying its place.

In France, the church in the castle at Caen has the entrance at the east end, and the high altar at the west. The altar in the cathedral at Besançon is placed in the middle of the church, which was turned towards the west. An altar at the west, as well as at the east end, is more frequent: this was the case in the Saxon cathedral of Canterbury, and in the church of S. Gall, and may still be seen in Nevers and Mayence cathedrals, in two churches at Falaise, and many others: and in the western apses of some churches in Germany, where the altars face westward, but the celebrant fronts the congregation.

In England, Rievaulx abbey alone is built nearly north and south, occasioned by the contracted site. The church of S. Mary Astbury, Cheshire, has a nave with ailes irregularly disposed: the north aile and chapel are considered to have been the original church; and the new nave, chancel, and south aile, together with an alteration in the dedication, led, from the principle of orientation to a fresh point of the compass in the new chancel differing from that of the older one; Freeman, in *Transactions* of the Cambridge Camden Society, pt. 3. The chapel 1584 of Emmanuel college, now the library, at Cambridge, made north and south, "contrary to the usage of the primitive times and the church of England"; Fuller, *Hist. of Camb.*, 8vo., Lond., 1840, p. 342; a new chapel built 1677, is east and west. Christchurch in Barnwell, near Cambridge, 1839, is north and south. The church of SS. Mary and Nicolas at Wilton, in Wiltshire, built 1843, is placed west and east to suit the street.

"On this side of the Alps, the expression 'east end', as synonymous with the 'altar end', would be always correct. It is so in nine cases out of ten in such Italian cities as Milan or Verona, but is correct only by accident in such as Pisa, Ferrara, Bologna, or any of the cities of the south, where the Gothic races did not entirely supersede the original population. —The orientation of churches, by turning their altars towards the east, is wholly a peculiarity of the Northern or Gothic races; the Italians never practised it"; Fergusson, *Handbook of Arch.*, 8vo., Lond., 1855, ii, 516.

Orientation is "I think, always attended to in Spain, save in cities like Barcelona, where the commercial intercourse with Italy perhaps introduced the Italian tradition. The feeling about the orientation of churches was stronger among the English and Germans than anywhere else, and possibly the Spanish tradition dates from the time of the Visigothic kings"; Street, *Gothic Arch. in Spain*, 8vo., London, 1865, p. 234.

"The rule of Chinese buildings opening to the south is so constant, that I now scarcely trust the notes in my diary, that the entrance to the pagoda at Nankin is from the west": communicated by William Simpson, esq.

In Hindostan, the great cave at Elephanta has the chief entrance to the north, but there are also doorways to the east and west. The great enclosures at Chillambaram, Seringham, and others, have each four entrances, the chief one being on the west side, and the buildings also facing westward. The tope at Amravati has four gates, of which the chief is to the south. The entrance to the Jaina temples at Brambanan, in Java, is to the west.

"In describing churches it is usual, for convenience, to use the terms east, west, north, and south, without reference to the real bearing of the edifice, but upon the assumption that the altar is at the east end"; Glossary, *s.v.* Altar; a practice not to be commended in recording facts.

The method adopted in fixing the orientation of churches, previous to commencing building operations, has been pre-

served in some of the Scotch lodges, and is thus explained :— The site of the altar was decided upon by the parties for whom the church was to be erected, marked by a pole fixed in the ground, and a day appointed when proceedings were to be commenced. On the evening previous, the patrons, ecclesiastics, and masons assembled, and spent the night in devotional exercises; one being placed to watch the rising of the sun, gave notice when his rays appeared above the horizon. When fully in view, the master mason sent out a man with a rod, which he ranged in line between the altar and the sun, and thus fixed the line of orientation. The poet WORDSWORTH has made this ceremony the subject of some stanzas. LAURIE, *Hist. of Freemasonry*, 8vo., Edinb., 1859, p. 414.

ASPLIN, *Alkibla; a Disquisition upon worshipping towards the east*, 8vo., London, 1728. CAMBRIDGE CAMDEN SOCIETY, *The Orientator*, 32mo., Camb., 1844. *Annales de Philosophie Chrétienne*, xix, 352. DU SOMMERARD, *Les Arts du Moyen Age*, ii, 99, etc. BATISSIER, *Eléments d'Archéologie*, 18mo., p. 545. NOTES AND QUERIES *Journal*, 2nd ser., xi, 138; 3rd Ser. i, 187, 247, 334. ASPECT. W. P.

ORIGIN OF ARCHITECTURE, OR OF BUILDING. Those who may be interested in these subjects, will find them treated by VITRUVIUS, book i, ch. 2; by MILIZIA, *Lives of Architects*, 8vo., London, 1826, xv-xviii; in GWILT, *Encyclopædia*, book i, chap. 2; the ENCYC. MÉTHODIQUE; CHAMBERS, *Decorative Part of Civil Architecture*, etc.

ORIGINALITY IN THE ARTS. The imagining and bringing into existence a form, an arrangement, a proportion, a part, or the whole, of an object, differing from those which have been heretofore produced. It is generally assumed that such a production should bear the test of favourable comparison with other works of high merit. On such a subject it is desirable to recall the remarks of a highly educated English professor of painting, which have stood the criticisms of about a century.

"A student", says Sir Joshua REYNOLDS, in his second *Discourse*, 11th Dec. 1769, "unacquainted with the attempts of former adventurers, is always apt to overrate his own abilities; to mistake the most trivial excursions for discoveries of moment, and every coast new to him for a new-found country," etc. "The productions of such minds are seldom distinguished by an air of *originality*; they are anticipated in their happiest efforts; and if they are found to differ in anything from their predecessors, it is only in irregular sallies and trifling conceits. The more extensive, therefore, your acquaintance is with the works of those who have excelled, the more extensive will be your powers of invention; and what may appear still more like a paradox, the more original will be your conceptions. But the difficulty on this occasion is to determine what ought to be proposed as works of excellence, and what ought to be considered as the properest guides."—"Those great masters who have travelled the same road with success, are the most likely to conduct others. The works of those, who have stood the test of ages, have a claim to that respect and veneration to which no modern can pretend.—There is no danger of studying too much the works of those great men; but how they may be studied to advantage is an inquiry of great importance."—Further on he declares, "You must have no dependence on your own genius. If you have great talents, industry will improve them; if you have but moderate abilities, industry will supply their deficiency. Nothing is denied to well-directed labour; nothing is to be obtained without it. Not to enter into metaphysical discussions on the nature or essence of *genius*, I will venture to assert, that assiduity unabated by difficulty, and a disposition eagerly directed to the object of its pursuit, will produce effects similar to those, which some call the result of *natural powers*."

In *Discourse* vi, he says he is "persuaded that by imitation only, variety, and even *originality of invention* is produced—even genius, at least what generally is so called, is the child of imitation.—Genius is supposed to be the power of producing excellencies which are out of the reach of the rules of art—a power which no precepts can teach, and which no industry can acquire.—Invention is one of the great marks of genius; but if we consult experience, we shall find that it is by being conversant with the inventions of others that we learn to invent, as by reading the thoughts of others we learn to think.—The sagacious imitator does not content himself with merely remarking what distinguishes the different *manner* or *genius* of each master; he enters into the contrivance in the composition how the masses of lights are disposed—the means by which the effect is produced—how artfully some parts are lost in the ground—others boldly relieved—and how all these are mutually altered and interchanged according to the reason and scheme of the work.—What is learned in this manner from the works of others becomes really our own, sinks deep, and is never forgotten; nay, it is by seizing on this clue that we proceed forward, and get farther and farther in enlarging the principles and improving the practice of our art.—It must be acknowledged that a peculiarity of style, either from its novelty, or by seeming to proceed from a peculiar turn of mind, often escapes blame; on the contrary, it is sometimes striking and pleasing; but this it is a vain labour to endeavour to imitate, because novelty and peculiarity being its only merit, when it ceases to be new it ceases to have value."

In *Discourse* xiii, 1786, occurs Reynolds's tribute to the genius of sir John Vanbrugh—"Thence it is that towers and battlements are so often selected by the painter and the poet, to make a part of a composition of their ideal landscape; it is from hence, in a great degree, that in the buildings of Vanbrugh, who was a poet as well as an architect, there is a greater display of *imagination* than we shall find perhaps in any other; and this is the ground of the effect we feel in many of his works, notwithstanding the faults with which many of them are justly charged.—He had originality of invention; he understood light and shadow, and had great skill in composition. To support his principal object he produced his second and third groups or masses; he perfectly understood in his art what is the most difficult in ours—the conduct of the background, by which the design and invention is set off to the greatest advantage.—Upon the whole it seems to me that the object and intention of all the arts is to supply the natural imperfection of things, and often to gratify the mind by realising and embodying what never existed but in the imagination."

Dr. Johnson, it is said, conceived it possible for the mind to be so overloaded with the ideas of others, that, oppressed with such a state of knowledge, it becomes incapable of exercising *any originality*, and can only reproduce that which it has already received from others, and even that only indifferently, unless fired by the same enthusiasm as the original authors.

COLERIDGE said that "to admire *on principle* is the only way to imitate without loss of originality"—a dictum which LESLIE adopted as a motto for his *Handbook for Young Painters*. To the architect might be said, that to design on principle is the only way to insure originality: BUILDER *Journal*, 1872, xxx, 37-8.

GWILT, in his edition 1825, p. 141, of CHAMBERS, *Decorative Part of Civil Architecture*, fol., 1759, found it necessary to add "All sense in the application of appropriate forms in mouldings seems now extinct, and Palladio set at defiance. He who can in the present day produce the newest and most extraordinary moulding in profiling an order is the greatest genius." *Originality in Architecture*, in BUILDER *Journal*, viii, 305; 314: and *Originality of Style*, 1861, xix, 465. *On Originality*, in BUILDING NEWS *Journal*, iii, 649.

In treating of *Originality*, with reference to architecture in France, BLONDEL, *Cours*, 8vo., Paris, 1771, i, 385, says that "A composition may be called original, when its style gives evidence that the artist, while keeping to the essential rules of

his art, has overstepped its boundaries, and, giving the reins to his genius, introduced new forms of beauty originating in, and strictly in keeping with, the intention to which the building owes its erection. Perfection, indeed, is now rarely seen in buildings, notwithstanding they are, for the most part, composed of the members of architecture found in the most admired edifices. Too often these are grouped together without design and without taste, as in the works of Meissonier, Oppenord, Cuvillier, and others, to copy whose style is calculated rather to confuse than to develope the imagination of young artists. These would do better to study the numerous *chefs-d'œuvre* of Hardouin Mansard, who perhaps of all French architects pushed to its extremest limit this character of originality, so greatly admired at the château de Clagny, the Trianon, the château and gardens at Marly, the outbuildings at Versailles on the side next Paris, at Meudon, Chantilly, Sceaux, S. Germain-en-Laye, and many other places. All these compositions, of a style and arrangement unknown before Mansard, are admirable examples, which may give the keynote to future pupils, if they once learn to feel that neither in architecture generally, nor in a particular plan, can beauty exist in the absence of certain features, which genius (*genre*) alone can produce, and which, to be approved, must be appropriate to the local position of the building, to its different points of view, its use, aspect, and surroundings. These essential points, well borne in mind, lead to those happy eccentricities of art, of which the man of genius knows how to avail himself, and by which he is enabled to give to buildings of a similar kind a pleasing character of variety and originality."

ORIHUELA (the Gothic *Orcelis*). A chief town in the province of Valencia, and one of the most ancient cities in Spain. It is situated on the river Segura, over which are two bridges. The college gate, the best of the entrances to the city, has a lofty arch with a gigantic statue representing the tutelar genius of the city. The see of the bishop dates from June 1265 or 1510. The cathedral, dedicated to S. Salvador, is small and antique, overcharged with Gothic details, and "barbarised" 1829 by Ripa. There are two parish churches within the walls; the principal chapel of that of Santiago is a miracle of art; two parish churches outside the walls, and five dependent churches. The colegio de Predicadores is of great extent, having spacious cloisters, a beautiful chapel, and a fine gate, 1518. There are numerous monasteries and hermitages. The university was founded 1552. The episcopal palace was built 1733, its front is about 200 paces long; the other buildings do not appear to demand attention. 14. 28. 50. 96.

ORILLON and OREILLON. A term in French architecture for the return at the corner of a dressing of a door or window. EAR.

ORILLON. A term in fortification for a small rounding of earth lined with a wall, which is raised on the shoulder of those bastions that have casements to cover the cannon in the retired flank, and to prevent their being dismounted by the enemy. Also explained as a little turret projecting from the flank angle of a bastion. 2. 5. 25.

ORINDA (MARTIN DE), according to his signature, and not Olindo or Dolindo, as sometimes written, lived at Madrid, whence he removed to Valencia, binding himself 18th April 1633 to finish the church of the monastery of Geronimo at S. Miguel de los Reyes, near Valencia, which P. de Ambuesa, who died 1632, had commenced 1623. Orinda commenced his work on 18th May, and completed it in 1644. The fine cloisters had been erected 1580-1605, by A. de Covarrubias. The prior paid the stipulated sum, and the community being well satisfied, made him a present of 2000 pieces *(pesos)* extra; but he would only accept half, after many entreaties, leaving the other half to the convent, for an anniversary to be celebrated for his soul. He built also the parish church at Liria, designed in the Doric order by Padre Rajas, with three naves and a cupola, the façade being by T. L. Esteve. Orinda died at Valencia, 2nd December 1655, and was interred in the above named monastery. 3. 66.

ORISTANO and ORISTAGNI. A town in Sardinia, situated near the mouth of the river Tirsi, has old walls and towers. The spacious cathedral dedicated in the name of the Assumption is of recent date: it has a detached octangular belfry with 150 steps to the top. There is another parish church, eleven monasteries, etc. The palace of judges of Arborea, is surrounded by iron railings, bearing the arms of Aragonese nobles. 14. 28. 75. 96.

ORLANDINI (.....), designed the chapels on each side of the church of Sta. Maria degli Angeli at Rome. 86.

ORLANDINO (TEODOSIO, printed TOMMASO in the Index) of Cremona, is said to have constructed the octagon baptistery at Brescia in 1167; *Virtù ravvivata della storico Bresciani*, p. 184; but it is generally stated to have been erected in 900. MURATORI, *Rer. Ital.*, vii, col. 634. 57.

ORLE, ORLET or ORLO. An Italian term used by PALLADIO for the plinth under the molded base of a column, or of its pedestal. It is also explained as a fillet under the ovolo or quarter round of a capital. When the fillet is at the top or bottom of a shaft of a column, and receives the apophyge, it is called a CINCTURE. 1. 4.

ORLEANS (Lat. *Aurelianum;* its pretensions to *Genabum Carnutum* have been ceded to Gien.) The capital of the department of Loiret in France, situated on the river Loire, both sides of which are lined with quays, and over which is a bridge about 1100 ft. long, by Hupeau and Peyronnet, 1751-61, of nine arches, the centre one being 108 ft. span, the smallest 100 ft., and 50 ft. 10 ins. wide: from one end of this, the grand new street, the *rue royale*, leads to the centre of the town, the *place* de Martroy; and from the other end a splendid avenue leads to the pretty suburb of Olivet, occupied by villas and nursery grounds. Promenades have been formed on the site of the ramparts. In one corner of the *place* is a bronze equestrian statue by Foyatier, of Jeanne d'Arc; another statue of her, from the original in the museum, executed by the princess Marie, daughter of king Louis Philippe, is at the foot of the hôtel de ville; and a third of bronze, in the attitude of rushing forward, by Gois fils, 1804, was placed 1855 at the south end of the bridge. A bronze statue of R. J. Pothier (died 1772) is by Vital Dubray, 1859.

The greater part of the old town is of timber. In the rue du Tabourg, No. 35, is a two-roomed lodge said to have been occupied by Jeanne d'Arc (engraved in VERDIER, i; and in BERTY, who says it was so called before 1429, but this one was built about 1580 for F. Colas, mayor). The house of Agnes Sorel, of 15th and 16th cents. (in VERDIER, i, 165, five plates; also POLLET, pl. 50). The house of Francis I, 1536-50 (POLLET, pl. 50-3), built on land which had belonged to Jean Mynier, master of masonry to the king at Orleans. The house of Diana of Poitiers (Renaissance) now the *musée historique*, is in the rue Neuve; and one No. 15 rue S. Anne, by J. Androuet du Cerceau, are both given in BERTY. No. 62 rue des Hôtelleries; one of timber (16th cent.; VERDIER, ii, p. 118); and a stone one, rue Pierre percée (p. 124), are among the best of these domestic dwellings. In the market place is one of the best preserved and extensive mediæval arcades in existence. Most of these domestic buildings were restored by L. Vaudoyer, as well as the façade of the *salle* S. Lazare at the *hôtel dieu*, and the *hôtel de ville;* and these with a number of other façades and their descriptions, are comprised in one volume by Vaudoyer in the COMMISSION DES MONUMENTS HISTORIQUES DE FRANCE, *Archives*.

The cathedral, dedicated to La Sainte Croix, founded 1287, greatly injured 1567, was commenced to be rebuilt by king Henry IV, 18th April 1601, "and is therefore remarkable as the only first-class Gothic cathedral erected in Europe since the

middle ages" (Fergusson). The works were continued under Barbet, J. H. Mansart (who designed the marble jubé 1690, destroyed at the Revolution), and Decoste. Then was commenced the *portail*, and the towers, each 280 ft. high, and 55 ft. 9 in. wide (also stated as 242 French ft. high, and 62 ft. wide, and 48 ft. deep); the height to the top of the angels is called 285 ft. 6 ins. The design, in the style of the thirteenth and fourteenth centuries, is generally attributed to Jacques Gabriel, architecte du roi (Gabriel, who died 1742), who directed the works 1723-66 (perhaps including his son, J. A. Gabriel); continued by Trouard 1766-73; Legrand 1773-82; Guillemot, Mique, and Jardin 1782-87; Paris 1787-90 who erected the colonnades designed by Trouard, on the third stage of the towers; and after a long interim they were completed by Pagot. The first *voûte* of the towers was only completed in 1829, and the great doors were opened 8th May. The flèche, rebuilt 1859 by Boeswilwald, is 50 ft. higher than the towers. In 1863 the building was said to present a rickety appearance, and the vaultings of one of the side chapels were rebuilt. The nave, 356 French ft. long inside and 56 ft. high (or 108 Eng. ft. as also stated), has a double aile 40 ft. high. The building is 486 ft. 6 in. long and 242 ft. 2 in. wide inside. Chapuy and Jolimont, *Cathédrales de France*, 4to., Paris, 1826; *Moyen Age Monumentale*, pl. 43; Chapuy, *France Mon.*, pl. 57: La Borde, *Monumens de France*, fol., Paris, 1816, pl. 166, gives a plan, west, and south views, pl. 258-9. Fergusson, *History of Arch.*, 8vo., Lond., 1867, i, 504. The church of S. Aignan, consecrated 1029, has a Romanesque crypt and a portal and nave of the fourteenth century, destroyed 1567, the steeple was demolished about 1835: it has been restored by — Clouet. The church of S. Pierre le Puellier, the oldest in the town (996-1031) is remarkable only for its antiquity; it was suppressed in 1793, but restored 1816. S. Euvertre was nearly rebuilt and opened 1857; Nôtre Dame de Recouvrance dates 1519; and S. Paterne was 1863 proposed to be rebuilt.

The tomb of Louis de France, duke of Orleans, second son of Charles V, is engraved in Le Noir, *Musée*, ii, pl. 73, No. 77; that of René d'Orleans, in Millin, *Antiq. Nationales*, pl. v; and in Le Noir, ii, pl. 88, No. 95: and that of Charles of Orleans, in Le Noir, ii, pl. 75, No. 80; and in Millin, i, No. 3.

The *palais de justice* by Pagot 1821-4 (Doric), contains the public library of upwards of 43,000 volumes, and the model for the towers and completion of the nave of the cathedral, which was made 1739 at Versailles for J. Gabriel, at a cost of 11,548 francs. The *mairie* of red brick and white stone (early Renaissance) 1530, was restored 1850-54 by A. Delton; the *hôtel de ville* 1422-98 by Viart (in Verdier, ii, 4 plates), contains the *musée* 1825 of local antiquities. The archbishop's palace 1631; the préfecture, restored 1864-5; the exchange (modern); the corn exchange 1826; the *salle des thèses* (15th cent.) of the university (given in Verdier, ii, p. 163); and the séminaire 1670, having the crypt of S. Avitus, 5th or 6th cent. (discovered 1852), 24 ft. 7 in. long and 19 ft. 7 in. wide, are among the other buildings of interest.

The edifices at Orleans are built of *pierre calcaire* similar to that of Paris, or more correctly of a *calcaire dite d'eau douce*, and analogous to that of chateau Landon: Brard, *Mineralogie*, 8vo., Paris, 1821, ii, 1821. 7. 14. 28. 50.

At Etampes, between Orleans and Paris, is a fine square Norman tower and octagonal spire, and four open-work pinnacles at the angles, in good preservation.

Vergnaud Romagnesi, *Indicateur Orléanais*, 12mo., 1827, the 2nd edit. is entitled *Hist. d'Orl.*, 12mo., 1830; *Nouveau Guide*, 8vo., 1868, etc.: *Hist. de la Cathédrale*, 8vo., 1829; and *Notice sur le fort des Tourelles sur l'ancien pont;* with another by Pensée, 4to. and plates, who also published *Orleans* (*Album Guide*), with plan 1843: and *Fête de Jeanne d'Arc*, 4to., Rouen: also a third work by Jollois, 4to., Paris, 1833; who likewise published *Antiquités du grand cimetière d'O.*, folio. Polluche, *Descr. de la ville d'O.*, 8vo., 1736; the 2nd edit. was by Beauvais de Préau, *Essais Hist. sur Orleans*, 8vo., 1778. De Caumont, *Bull. Mont.*, 8vo., Caen, 1868, 4th ser., iv. Jousse, *Détail Hist. d'Orl.*, 12mo, 1736-42-52. Verdier and Cattois, *Arch. Civile et Domestique*, 4to., Paris, 1852-55. Pollet and Roux, *Recueil d'Edifices*, fol., Lyons, 1840-41. Berty, *La Renaissance Monumentale*, 4to., Paris, 1862-6, ii, pl. 26-31. Biet, *Souvenirs du musée*, fol. Pugin, *A short Account*, 8vo. Herluison, *Artistes Orléanais;—nés pour la plupart dans la Province*, 8vo., Orléans, 1863. Buzonnière, *Hist. Architecturale de la ville*, 8vo., Paris, 1849. Hamel, *Histoire*, 1848. Builder *Journal*, 1853, xi, 99; xix, 471. Joanne, *Itinéraire*, 12mo., Paris, 1868. Viollet-le-Duc, *Dict.*, s. v. in Index.

ORLEANS (Arnold II of), bishop of Orleans, rebuilt his cathedral church burnt in 988; in which he was assisted by king Robert, and by a treasure which was accidentally discovered in digging the foundations; Glaber, *Hist. sui temporis*, apud Script. Duchesne, iv. Maroles, *Hist. des roys de France*, p. 157: Ramée, *Manuel de l'hist. de l'Arch.*, 8vo., Paris, 1843, ii, 133; 135.

ORLEANS (Theodulphus of), abbot of Fleury (S. Benoît sur Loire), and bishop of Orleans, constructed a church at Germigny (Loiret), dedicated in 806, after the plan of that at Aix la Chapelle; and that of S. Riquier in Ponthieu, founded by Charlemagne about 800, wherein is the tomb of abbot Angilbert; Ramée, *Manuel* 1843, ii, 123. Létalde, a writer of the tenth century, in Mabillon, *Act. Ord. S.B.* p. 598: Gallia Christ., viii, p. 1420; *Annal. Bened.* ii, 317.

ORLO, see Orle.

ORLOPS. A term in use 1736 by plumbers (perhaps a corruption of "overlap"); for a width of about 3½ in. of a sheet of lead, raised up along its edge in order to form a roll for a flat. It is to be placed against the *stander* or *upstand* of the other sheet, which is a width of about 2½ in. also set up at right angles to the sheet all along one edge of it. The orlop is then turned over on upon the stander, and the whole beaten down over the wood roll. 4.

ORME (Pierre del') or P. Delorme, and Pierres de Lourme as named in an account dated 1502, when he was engaged for Georges cardinal d'Amboise on a gallery in the archiepiscopal palace at Rouen (demolished 1817), was master mason at Rouen. He probably succeeded Senault, Fouquet, and Fain, at the château de Gaillon, constructed (and perhaps designed), 1506-1509, one of the four sides of the central court, which was called *maison Pierre Delorme;* repaired the *viel corps d'ostel* commenced by order of cardinal d'Estourville; afterwards erected the square pavilion called the *portail neuf*, which led to the grand court; made the slopes of the moat, and the tennis court with *l'acoutouer en pierre de Vernon*, and other works in the gardens; acting as 'architect and sculptor', according to Deville, *Comptes de dépense*; 4to., Paris, 1850, lviii, xcix, cii, 188, etc.

ORME (Toussaint del'), mason, worked 1505 at the same château, on the decorations of the gallery and the terrace of the *grande maison* on the side of the moat. Michelet Loir worked with him. Lance, *Dict. Biog.*, 1872.

ORME, frequently written De Lorme and De l'Orme in the sixteenth century, and at present Delorme (Jean, and Philibert de l'). Not much was known of the lives of these brothers, until the name of Jean or Jehan was noticed in the incorrect work of Callet (p. 15-43), and until the discovery by Léopold Delisle of an autobiography of Philibert, written about the close of 1560, and existing in the Bibliothèque Impériale, where it is marked fols. 204-206 *bis* of the *MS. Fontette*, xxxv A, *Bourgogne Généalogique*, which was printed by Berty (p. 49-59).

The parentage of the brothers is not known: Callet has no reason for the assumption that Philibert was the elder; and founds the statement that their father was a contractor, upon a

satire by RONSARD, *La Truelle Crossée*, as if that poem still existed; whereas "j'ay veu trop de maçons bastir les Tuileries" are nine of the seventeen words which alone remain of it: BERTY supposes that the brothers might be relations of the Delormes employed at Gaillon. Little credence can be given to CALLET'S assertions, that Jean was an artist, Philibert a builder; that Jean was employed at Anet more than Philibert, whom he accuses of a deceptive description of the entrance there; that Jean was the actual, Philibert the nominal, architect of the Tuileries; and that Jean was in part the author of the *Architecture* given under the name of Philibert, being the person whose assistance is disguised at p. 5, by Philibert, in the words "toutes les notes qui dans ce volume sont propres à fournir les preuves de mon savoir n'ont point été écrites par moi, mais qu'elles ont été faites par quelqu'un de mes amis": and even if CALLET were right on this last point, he would not be justified in considering that Jean was unknown "grâce à la basse jalousie et à l'hypocrite réticence" of Philibert, whom he stigmatises (p. 15, 19, 31, 36) as "dévot par goût ou par spéculation, mais à coup sûr grandement hypocrite, plus adroit courtisan qu'habile dessinateur, jésuite de robe courte, homme astucieux".

JEAN DE L'ORME, sieur de S. Germain, succeeded Gilles le Breton as maître général des œuvres de maçonnerie du roi Henri II; the appointment was revoked 24th February 1552, during his travels in Italy, "faire le service du fait des fortifications des places fortes" (BERTY, p. 45). In 1554, by a letter patent of the same monarch, he was appointed "maître architecte et conducteur général des édifices, bâtiments, reparations, et fortifications du duché de Bretagne," which office in 1559 was given to Jean Gannet. In 1555 he commenced for Diana of Poitiers at the château de Chenonceaux, the bridge with a gallery which joins the principal building to the left bank of the Cher. In 1558 he was appointed "commissaire député par le roi sur le fait de ses édiffices et bastimens", with a yearly salary of 600 livres (BERTY, p. 46). The letters patent issued in February 1563-4, about the demolition of the hôtel des Tournelles, mention JEAN, with his former title of "maître général des œuvres de maçonnerie du roi" or "royaume" (now "inspecteur général des travaux de construction"), commissioned to measure the land on sale: similar letters dated 15th May 1565, cited by FELIBIEN, show that the care of disposing of that ground was transferred to Philibert. JAL cites the permission given by Charles IX, April 11th 1566, to "Me. Jehan de Lorme" to resign his charge to Etienne Grant Remy, without "pour ce paier finances; (signed) Charles de l'Aubespine; Reg. KK, 94 des Arch. de l'Emp." Jean de l'Orme's death may have occurred soon afterwards.

In 1624 "a sieur de S. Germain", probably a son of Jean, was employed by king Louis XIII, to make drawings, etc.; LANCE, *Dict. Biog.*

PHILIBERT DE L'ORME. The life of this architect as here given follows the account by BERTY, who collected other documents and passages in other writers, which he collated with the *Autobiography* above mentioned, and with Philibert's two publications. These are entitled *Nouvelles Inventions pour bien bastir et à petits frais*, fol., Paris, 1561; others, 1568, 1576, and 1578: and *Le Premier* (the second never appeared) *Tome de l'Architecture*, fol., Paris, 1567, in nine books, with his portrait; this edition is very rare; a copy with the signature of I. Jones is in Worcester college library at Oxford: some copies are dated 1568 and 1691: other editions dated Paris, 1626, and Rouen 1648, include the previous work as the tenth and eleventh books.

Philibert appears to have been born about 1515, at Lyon, as may be gathered from his statements of having daily superintended more than 300 men when he was fifteen years old, and of having observed practice for more than thirty-five years before he published his work in 1567; these correct the date 1520 given for his birth by PASSERON; and 1518 by CALLET. De l'Orme went to Rome, where he erected scaffolding and made excavations at such places as he wished to measure; preceding Palladio in the discovery and publication of the ancient process of drawing the volute for an Ionic capital preserved in the church of Sta. Maria di Trastevere. In these studies he was encouraged by pope (1555-60) Marcello II (Cervini), then cardinal di Santa Croce, a dignity which followed the accession 13th October 1534 of Paul III: and to this friend probably Philibert owed "une belle charge à S. Martin dello Bosco à la Callabre" under that pope. He was persuaded by cardinal Jean du Bellay and his brother Guillaume du Bellay M. de (Langeais) Langés to return home to France, and in 1536 Philibert was residing at Lyon, where he executed two corbels (*trompes*), upon which were carried several floors, to the front of the house of M. Billau, général (of the Jesuits) de Bretagne, in the rue de la Juiverie (now No. 8); with others; and also commenced about 1542 (POLLET, pl. 7-19, dates it 1556) but perhaps did not complete, the *portail* to the church of S. Nizier in that city, according to BROSSETTE (p. 89). He left that city soon afterwards, according to D'ARGENVILLE, who cites no authority, but probably knew that at the end of the translation of VITRUVIUS by MARTIN, fol., Paris, 1547, there is an epistle to the reader, by J. Goujon, who mentions "maistre Philibert de l'Orme lequel assez suffisamment a conduict un édifice que monseigneur le cardinal du Bellay a faict faire en son lieu de Sainct Mor (Maur) des Fossez lez Paris"; this château was altered and enlarged for queen Catherine, by Philibert, who had some furniture there at his death (BERTY, p. 45), but has been destroyed.

The departure from Lyon, however, must have been earlier, if the château was completed before Philibert was employed by Francis I (died 31st March 1547); for whom for some years (probably four) he went on half-yearly visits of inspection as military engineer to the coast and forts of Bretagne. He acted 1545 as commissary or purveyor of the camp at Boulogne for four months, and as inspector of the marine force of Normandy; he saved the town of Brest from an attack by the English, before the peace was made, 7th June 1546; and he mentions that, as commandant of some places which he does not name, he was several times besieged; but he specifies Brest, S. Malo, Concarneau, and Mantes, among the places which he visited. He takes credit for the detection of errors and frauds committed in measuring, valuing, and executing works for the government in Picardy and at Brest, as well as at Fontainebleau, Villers-Cotterets, S. Germain, etc. Moreover he demands applause "d'avoir porté en France la façon de bien bastir, osté les façons barbares et grandes commissures (wide joints), monstré a tous comme l'on doibt observer les mesures de Architecture, tant que j'ay faict les meilleurs ouvriers qui sont aujourd'huy, comme ilz confessent." He was director of the factory of tapestry at Fontainebleau, according to LACORDAIRE (p. 18): was appointed 3rd April 1548 inspector of the royal buildings at Fontainebleau, S. Germain, etc. (the modern surintendant des bâtiments de la couronne): and by letters patent 29th January 1548-9 architecte du roy, being already counsellor and almoner in ordinary to Henry II, who gave him 1548 the abbey of S. Barthélemy-lez-Noyon, which he retained until his death; and 1549 the abbey of Ivry (now Ivry-la-Bataille) which he resigned 1560 in favour of Jacques, brother of Diane de Poitiers, duchesse de Valentinois, but received in its stead that of S. Serge-les-Angers, which he retained also until his death. A canonry in Nôtre Dame was given to him early in 1550 by the cardinal du Bellay as bishop of Paris, who died 15th March of that year. He also had 1547 the abbey of Géveton in Bretagne, the first of the king's gifts to him; and possessed from 1555 till at least 1561, that of S. Eloy-lez-Noyon. The two abbeys which he possessed at his death, gave him an income of four thousand livres, out of which, and his other appointments, he had to pay the principal and interest of the sums that he had borrowed for the

execution of some of the works upon which he was employed. It thus appears that he not only designed those works as architect, but executed them as builder (Berty, p. 56). Indeed the abbé d'Ivry or de S. Serge, as in his latter days he called himself, states that he never received from Henry II one (*maille*) halfpenny in money, although he had to keep a dozen horses, pay travelling expenses, keep open house wherever he went for the "cappitaynes, concierges, controlleurs, et maîtres-maçons, charpentiers, et aultres", provide models, and support, besides other assistants, five nephews (of whom nothing more is known) during their study of architecture.

There does not appear to be any possibility of arranging in order of time the works executed by de l'Orme up to the compilation of his autobiography. These subjects form the following list:—The "*archenac et magazin de l'artillereye*" at Paris, which Berty (p. 35) assumes to be the sheds (*les halles*), commenced in July 1549, for founding and storing cannon.—The tomb of Francis I and his queen Claude at S. Denis, which he calls a work "qui se trouve très belle". It was built by Ambroise Perret and Jacques Chanteril, tailleurs en marbre; the effigy by Pierre Bontemps; and the contracts for which dated 6th October 1552, and 10th February 1558, by Germain Pilon, are mentioned by Berty (p. 29), as printed by A. Lenoir, *Musée des Monuments Français*, 8vo., Paris, 1800-3, iii, 75-6. The design has been attributed to N. da Modena, who may have worked upon it. A view is given in Bordier (p. 39).—Some staircases and chimney stacks at the château de Madrid, or du Bois de Boulogne, demolished 1792 (his *Architecture*, 124a, 268a): but Callet (p. 22) insists that the south portion having been finished 1526-7 by Luca della Robbia, the northern part was completed by de l'Orme, who omitted the decoration which the Italian had employed. Luca, however, returned to Florence 1553, and came back after Primaticcio 1559 had replaced de l'Orme.—The continuation 1559 of the chapelle du Bois de Vincennes, and some small works at the royal château of Coucy, and at the neighbouring pavilion called Folembray. The "grand perron qui est en la basse court, qui est une des plus belles œuvres que l'on scauroit veoir", as he calls it, may be supposed to be the great stairs reconstructed by Le Mercier for Louis XIII, in the cour du Cheval Blanc *(en fer de cheval)*, at the château of Fontainebleau. (D'Argenville says this was de l'Orme's first work). He also mentions the great ball-room, the chapel "ou je fiz ce polpitre et coulompne de marbre"; the cabinet of the queen-dowager; the cabinet and chamber of the king in the pavilion on the pond; and the vestibule of the "salle du roi comme je vouloys faire, où je faisoys les poultres de troys à quatre cens pièces, qui estoyt quasi achevé de faire, et les combles de plusieurs pièces"; and the maintenance of the great gallery.

With regard to works attributed to de l'Orme by some authors, at the château of S. Germain en Laye, he claims nothing but additions when he says, "s'ilz eussent eu patience que j'eusse faict achever le bastiment neuf, que j'ay commancé auprès des loges des bestes, je suys asseuré qu'aujourd'huy l'on n'eust vu le semblable, ne plus admyrable, tant pour les porticques, vestibules, théâtres, estuves, baignières, comme le logis"—"ils confessent que la chappelle du parc que j'ay faict de neuf est fort jolye"; and he mentions as his work "les ornemens et polpitre de la chapelle du chasteau et la cloison qui y est et la fontayne,—et le pont de la royne."

The roofing of the château de la Muette at Passy (illustrations in the *Architecture*, p. 290*a* and 297*b*), where the centre and two pavilions were covered by him at a cost of 18,000 livres repaid by the "office de maître au chambre des comptes", and the roofing of two other pavilions, to be repaid by the office of auditor in that chamber, which was not duly given into his possession. An account of the expenses at this place, for the year 1550, existing in the *Bib. Imp.*, No. 9436, fos. 124*b* and 300*a*, gives his titles at that period in full. The pavilion of the principal staircase was covered with a roof of 10 toises, the first constructed on de l'Orme's invention; and, according to Callet's version (p. 27) of the matter, the inexperience of the workmen caused them to put it together so badly that it fell, carrying with it the terrace which was the previous covering of the pavilion, and destroying the marble staircase.—The great gallery, the little chapel, and the pavilions of the château at S. Léger in the forest of Montfort-l'Amaury (*Arch.*, p. 322*a*).—A roof 186 ft. long by 84 ft. wide (14 toises long, 31 ft. wide, Lance), on his new system, at a cost of 1000 or only one-third of the price chargeable under the old method, for the château of Diane de Poitiers, at Limours near Rambouillet (*Arch.*, p. 296*a*), destroyed at the beginning of the nineteenth century.—The carpentry for the place where the game of pall-mall was played, which queen Catherine desired to be covered, at the château of Monceaux, "là où j'avais dressé de tant belles inventions".—The chapel in the park at Villers-Cotterets, where the *portail* exhibited the first attempt at what he termed an *Ordre Français;* the columns being banded in order to hide the joints (*Arch.*, p. 218).—The chapel des Orfévres de S. Eloi (now No. 4), rue des Orfévres, at Paris, attributed in 1550 to de l'Orme by Brice (i, 210, 221) converted 1786 into a private house, and now an école communale; Felibien (ii, 931) notices that the contract for its erection 31 December 1550 was signed by two architects, whom Berty (p. 23) shows were the maîtres-maçons François de la Flasche and Jean Marchand.

Philibert's publications make mention in several places and give illustrations of the château d'Anet, between Dreux and Mantes, which was an old *manoir* of the count Pierre de Brézé (died 1531), whose widow Diane de Poitiers had been residing there for about twenty-one years after her husband's death, when her lover Henry II directed de l'Orme to convert it for her into a sumptuous residence. Its remains were being carefully preserved by M. Passi in 1834, when its moat and enclosing walls, some rooms with handsome chimneys, a part of the chancery, the gateway, and two chapels (one of which had contained the tomb of Diane) were better evidences of its architect's skill than any part of the Tuileries. In this "château d'Anet, construit par l'ordonnance de l'auteur", he seems to admit that the two river pavilions with the saloon in front of the bath and the hôtel-dieu at the end of the park were buildings erected by some other architect but roofed by him. The chapel, except for the loss of Goujon's apostles and Cousin's glass, is in tolerable preservation. The gateway, from which the celebrated bronze bas-relief of the "Reclining Nymph" made for Fontainebleau by Cellini has been taken to the Louvre, is shown in Callet; and the three-storied portal of the façade of the house has been removed to the courtyard of the École des Beaux-Arts; its inscription records that the work was begun 1548. A view of the château is given in Bordier, ii, 130. Penor, *Monographie du Château d'Anet construit par P. de l'Orme en* 1548, 58 pl., fol., Paris, 1867. Rouyer et Darcel, *L'Art Architectural en France*, 4to., Paris, 1863-66, i, 27. Some casts are in the museum at South Kensington, and illustrations given in Wornum, *Catalogue of Renaissance Casts*, 8vo., Lond., 1854.

The first château, erected 1552 or 1556 at Meudon for the cardinal of Lorraine, purchased and almost demolished by Louis XIV, is attributed to de l'Orme by several writers, and to N. da Modena by others; and also its ugly but celebrated grotto given in Callet as a work by Primaticcio; but de l'Orme does not mention this place. The omission is supposed by Berty (p. 15, 25) to arise from its being the site where a vain effort to raise water from a river to a garden had been made by "un architecte françois qui se faisoit quasi appeler le dieu des maçons ou architectes, et d'autant qu'il possédoit vint mil en bénéfices, et qu'il se scavoit bien accommoder à la cour." According to Palissy, a denial of these 20,000 livres seems to have been the object of the *Autobiography*, which mentions

(p. 59) the "hostel-Dieu de S. Jacques du Hault Pas que j'avoys commancé", *i.e.*, apparently before he was superseded 1559 by Primaticcio; and the "escuyeries" or stables belonging to queen Catherine's hôtel des Tournelles, near the Bastille, which are not to be confounded with the *écuries des Tuileries* also by him, which were destroyed for the prolongation of the rue de Rivoli by Napoleon (Callet, p. 5). A *trompe* with a "petit corp d'hostel" of the Doric and Ionic orders for the house of the banker Patoillet, Pantouillet, or Patrouillet (a *cabaret* in the time of Sauval, iii, 3; and 43) in the rue de la Savaterie (S. Éloy in the Cité) at Paris; and many others of various kinds (*Architecture*, p. 90*a*) including the celebrated example (now destroyed) at Anet: these are specially mentioned, because a *trompe* was for some centuries a touchstone for the skill of the French masons.

Of Philibert little more notice occurs. In 1567 he had not completed his own house (No. 8 in 1843, but No. 22 in 1860) in the rue de la Cérisaie; Callet gives a plan and two views of the main building, which still partly exists, and is recognised by its great central *lucarne* or dormer window: two views of the part finished, and one of the portion intended, are given in the *Architecture*, p. 253-5.—The original plan of the château des Tuileries for queen Catherine is given in Androuet du Cerceau, *Des plus excellens bastimens*, fol., Paris, 1571-9, ii, consisting of a large court with four smaller ones, is usually attributed by Sauval (ii, 53), and Brice, (i, 188), to Bullant, and placed in the hands of de l'Orme for execution; and this ascription is repeated by Callet (p. 4 and 33), who intimates that Philibert confesses that fact, and evades acknowledgment of Jean's help in the following passage of the *Architecture* (p. 155*b*); "le palais lequel sa majesté la reine—fait aujourd'hui bastir en cette ville de Paris sous ses ordonnances et desseings, car je procède tout ainsi qu'il plaît à sa majesté me le commander sauf les ornements symétries et mesures pour lesquels elle me fait cette grâce et faveur de s'en fier à moi": the probable date of Jean's death has been mentioned. This work was begun about 1564, and the portion executed by Philibert was about half of one of the great masses of the plan now forming the central pavilion of the west or garden front of the palace and the adjacent wings each of thirteen arcades and one story with attic (seen in Bordier, p. 132), scarcely to be recognised since the additions and alterations made by Le Vau and d'Orbay; in fact, all that remained of de l'Orme's design, after the celebrated geometrical staircase in the centre was destroyed 1664, was the order running along the ground floor. Legrand et Landon, *Descr. de Paris*, 8vo., Paris, 1808, pt. ii, 13-8, and plate. Blondel, *Arch. Franç.*, fol., Paris, 1756, iv. The Ionic and Corinthian orders are given in Blondel, *Cours*, ii, 218, pl. 92; the *avant corps*, iii, 73, pl. ix: the circular geometrical stairs 27 Fr. ft. in diam. in three flights, each 9 ft. wide and 9 ft. long, iv, 297; also in Sauval, ii, 54, and iii, 43, who states that Philibert died before it was completed, and that Boullet, master mason, was the only one that could complete it.

A plan and section of an unexecuted design for the refectory of the nuns of the abbey at Montmartre, is shown in the *Architecture*, p. 304 *b*. The enclosure of the court in front of the church at Nogent-sur-Seine, which was attributed to de l'Orme by A. Lenoir, *Musée*, iii, 156, is repudiated by Berty (p. 28). The tomb of the Valois at S. Denis, ascribed to de l'Orme by Felibien, *Hist. de l'Abbaye*, fol., Paris, 1706, p. 565, is likewise repudiated by Berty (p. 29), who notices that (it was commenced 1560 by) Primaticcio, (and continued by) Bullant, and Baptiste Androuet du Cerceau, are the only architects that are named in the accounts of expenses there. Aicard, *Patria*, adds, "perhaps" the tomb of L. de Brézé in Rouen cathedral, executed about 1541; Goujon did perhaps some of the sculptures. The tomb of Anne de Montmorency, constable of France, in the church at Montmorency, now Enghien, near Paris, is attributed to de l'Orme by Virloys, *Dict.* The stalls of the choir of the chapel of Ivry, and the project for a bridge of a single arch before the port du Pecq; the door of the chapel at Compiègne, of which he restored the vaulting and decorated the façade next the tower, are both mentioned in Lance.

Although he had 1551 taken his seat in the chapter of Notre Dame, he does not appear to have again attended until 17 November 1561, after which period his presence is frequently recorded; his specification for the repairs to the cathedral was accepted 4 May 1568, and his *death* occurred at Paris about 7.0 p.m. on Sunday 8 January 1570, according to a register of the chapter (*Arch. de l'Empire, MS. Reg. LL*, 260, p. 278; and so stated in Passeron; Laborde (i, part 2, p. 107*2*) supposed it was in 1568; Callet gives the date 30 May 1577, aged 59 years; Jal that of 9 Feb. 1577; Virloys and Milizia, 1577; and Blondel, *Cours*, 1617. De l'Orme's will does not appear to have been referred to by any writer. Jean de Lespine or l'Epine was a pupil.

Great part of the text of the patent dated 3 April 1548 is given by Callet (p. 128), in which Henri II styles Philibert "notre architecte ordinaire", and commissions him to inquire how Francis I had been served at Fontainebleau (by Serlio, who seems thereby to have been dismissed), S. Germain en Laye, Villers Cotterets, Yerres, and the Bois de Boulogne dit Madrid; Callet follows it with a note of another dated 29 January, 1548-9, about repairs of the château de la Muette in the forest of S. Germain en Laye, from the *Bib. Roy. MS.*, Suppl., No. 182, fol. 158*b*, which seems to be the "procès-verbal de visite" mentioned in Berty (p. 7), who refers to an unpublished work by Léon de Laborde, *La Renaissance des Arts à la Cour de France*, iii, pp. 161 and 165. In the accounts for the château of S. Germain en Laye for 1550 in the *Bib. Imp. MS.*, No. 9436, fo. 124*b*, and 300*a*, Philibert appears with all his titles as "commissaire ordonné et depputé" by the king, "sur le faict de ses bastimens et eddifices" there (Berty, p. 25). By a patent dated 16 January, 1559 (1560), it appears that when Bullant was appointed 25 Oct. 1557 to succeed P. Deshôstels as "*contrôleur* des bâtiments", Henry II had taken half the salary (1200 livres) of that place "en faveur de maistre Philbert de Lorme, abbé d'Ivry, ayant lors la charge de superintendant sur tous et chascuns lesdits bastimens" (royaux), to give it "à Jean de Lorme, frère dudit abbé d'Ivry, pour ordonner en son absence desdits bastimens": consequently the account for the year 1558 mentions maistre Jean de l'Orme, as noticed in his life. From an order of payment dated 10 May, 1559, for ironwork supplied at Vincennes, Berty (p. 31) gives a fac-simile of the *signature* of Philibert. The two brothers were superseded 12 July 1559, two days after the death of Henry II, by Primaticcio, as appears from a patent, *Bib. Reg. Suppl.*, No. 182, fol. 329, printed by Callet, p. 27, and given in Laborde, iii, 333; which further shows that their conjoint annual salary was 1200 livres, and that all the royal buildings except the Louvre were under their care. The anger of Philibert is expressed in his autobiography and in several curious passages in the *Nouvelles Inventions*, p. 35*a* and 38*b*, as well as in the *Architecture*, preface, pp. 21*b*, 229*b*, and 328*a*.

Believing himself to be justified in assuming the title of architect, Philibert de l'Orme made no peace with the incapacity of workmen, the ineptitude of master masons and master carpenters, the tricks of clerks of the works, the dishonesty of surveyors, the fallacies of draughtsmen, or the presumption of carvers and sculptors; the enmities provoked by him had their revenge on the second day after the accession of Francis II, when the official post held by the brothers Philibert and Jean was given to Primaticcio, although they had been about fifteen years in the royal service. It is evident that this blow was not caused by any feeling of the inferiority of Philibert to Primaticcio, Lescot, or Bullant; nor by his

previous employment for the disgraced duchesse de Valentinois; it was accompanied by accusations of malversation and of receipt of exorbitant remuneration; but the subsequent employment of the brothers by the Italian queen-dowager Catherine, and Philibert's retention of his acquisitions, are facts which satisfactorily answer the imputation of either incapacity or dishonesty. The praise bestowed on Philibert by RABELAIS, GOUJON, and BERTY, is to be weighed against the abuse of him by RONSARD, PALISSY, and CALLET. He may have been too illiterate as an ecclesiastic of that period; and so bad a draughtsman as to justify the remarks of FREART DE CHAMBRAY, *Parallèle*, fol., Paris, 1702, pp. 52-4 and 84; but he so far profited by the lessons of Oronce Finée that he popularised stereotomy by the two sections of his *Architecture*, which for nearly a century remained almost the only work on the subject; and he could cite the authority of Alberti in depreciation of elaborate drawing while he reproved carelessness. His flitched frames for roofs (LAMINATED RIB, where a description of them is given with woodcuts), and other inventions, have been used without acknowledgment; so that it still remains doubtful whether it can be fairly said that his mastery of the science, rather than his proficiency in the art, of building, was the true source of the great reputation which has always attached to the name of de l'Orme: but it seems probable that he was the only architect, at that time, who in any measure combined both those claims to esteem. Bullant and de l'Orme were among the architects who early contributed to effect the introduction of the Renaissance into France.

The account of de l'Orme in the PENNY CYCLOPÆDIA, 1851, compiled from the work by CALLET, concludes thus: "Like some of his contemporaries, Philibert Delorme might still be allowed to hold that rank in his art which the courtesy of history concedes to those who have been great in their time and for their time, did he not now stand unmasked to the world as a Tartuffe both in art and in moral character,"—a conclusion to which the readers of the memoir here given are not likely to accede.

Titles of the publications quoted:—CALLET, *Notice hist. sur quelques Architectes Français*, 8vo., Paris, 1843. BERTY, *Les Grands Architectes*, 8vo., Paris, 1860. PASSERON, *Notice*, in *Revue de Lyonn.*, iii; and *Biographie des Artistes Lyonnais*, 8vo., 1854. POLLET et ROUX, *Mons. d'Arch. Gothique*, etc., fol., Paris, 1841. BROSSETTE, *Hist. abrégée de la Ville de Lyon*, 1711. QUATREMÈRE DE QUINCY, *Vies des Arch.*, 8vo., Paris, 1830. DEZALIER D'ARGENVILLE, *Vie des Arch.*, 8vo., Paris, 1788. LACORDAIRE, *Not. hist. sur les Manufactures Imp. de Tapis., des Gobelins*, etc., 8vo., Paris, 1853. BORDIER et CHARTON, *Histoire de France*, 8vo., Paris, 1859. BRICE, *Nouv. descr. de Paris*, 12mo., Paris, 1725. FELIBIEN, *Histoire de Paris*, fol., Paris, 1725. PALISSY, *Discours admirables*, Cap. Eaux et Fontaines, 8vo., Paris, 1580. SAUVAL, *Histoire*, fol., Paris, 1724. LANCE, *Dict. Biog. des Arch. Franç.*, 8vo., Paris, 1872. JAL, *Dict. Critique*, 8vo., Paris, 1867. *J. W. P.

C. B., *Dict. des rues de Lyon*. BEAUCOUSIN, *Hist. de Noyon*. DESTAILLEUR, *Notices sur quelques Arch.*, 8vo., Paris, 1864. COLONIA, *Hist. Litt. de Lyon*, 4to., Lyon, 1728-30. FLACHERON, *Eloge historique*, 8vo., Lyon, 1814. I'ANSON, *Some French Châteaux*, read at Royal Inst. of Brit. Archts., 1855-56, p. 54. DETOURNELLE, *Charpente de P. de l'Orme*, fol., Paris, 1800. 5. 34. 47. 83. 84. 112. 113.

ORMOULU or ORMOLU. An alloy of 72·43 copper, 25·2 zinc, and 2·65 tin, used for cheap articles of jewelry, metal-work, and ornamental inlay work. It is produced by casting the metals in a mould; the flat metal is usually incised when used in inlay-work, as in Buhl work. Mosaic gold, another name for such a metal, is composed of 65·0 copper and 35 zinc. BRONZE.

ORNAMENT. Accessory portions added to a work of art to impart interest, effect, and beauty. The application of botanical specimens (BOTANY; LEAFAGE), as leaves, flowers, and fruit, to architectural purposes has been universal at all periods; and mediæval architects especially, selected the palm, maple, ivy, vine, oak, strawberry, planta-genista, five-petaled wild rose, fleur-de-lis, trefoil, holly, wood avens or herb bennet (Early English leaf), hop, hazel, fern, with countless varieties; which they disposed in endless forms.

"Ornament, in the true and proper meaning of the word, signifies the embellishment of that which is in itself useful, in an appropriate manner. Yet, by a perversion of the term, it is frequently applied to mere enrichment, which deserves no other name than that of unmeaning detail, dictated by no rule but that of individual fancy and caprice. Every ornament, to deserve the name, must possess an appropriate meaning, and be introduced with an intelligent purpose, and on reasonable grounds. The symbolical associations [if any] of each ornament must be understood and considered; otherwise, things beautiful in themselves will be rendered absurd by their application"; PUGIN, *Glossary of Ecclesiastical Ornament*, etc., 4to., London, 1844, p. iii.

"Architectural ornament is of two kinds, *constructive* and *decorative*. By the former is meant all those contrivances, such as capitals, brackets, vaulting shafts, and the like, which serve to explain or give expression to the construction; by the latter, such as mouldings, frets, foliage, etc., which give grace and life either to the actual constructive forms, or to the constructive decoration"; FERGUSSON, *Handbook of Architecture*, 8vo., London, 1855, i, p. xliii.

"The whole grammar of ornament consists in contrast, repetition, and series.—In no popular style of ornament have natural details ever yet prevailed. The details of all great styles are largely derived from nature, but for the most part conventionally treated; and theory and experience seem to show that this is the true system. A plant is said to be conventionally treated (CONVENTION), where the natural order of its growth or development is disregarded. Where the exact imitation of the details, and its own order of development are both observed, the treatment is natural; and an object so treated, independent of any application, is only a picture or model, not an ornament; to be an ornament, it must be applied as an accessory decoration to something else"; WORNUM, *Analysis of Ornament*, 8vo., London, 1856, p. 15.

"Ornament is produced by a more or less pleasing change in the surface of an object, resulting either from its being raised or incised, or from its being marked with colours differing from the ground colour of the object. By the introduction of shading upon a flat ground, of course the effect of an incised or raised ornament may be produced." The simplest ornament of the Early British and Anglo-Saxon periods, consists of a repetition of dots or points, circular, square, or triangular. Then succeeds a single line, or a series of parallel straight lines placed horizontally, vertically, or obliquely as the zigzag or scollop as WV, or double round as ∽; the guilloche ensues, as well as the scroll; the right line more or less repeatedly bent at right angles, making a step-like ornament as ⌋⌉⌋; the use of the letter T in various positions; the Greek or Maltese cross; the fret, "occasionally, I believe, termed the 'gammadion';" a number of fine lines arranged diagonally in which the letter Z seems to be the primary element, "is, I apprehend, exclusively national." The interlaced ribbon pattern. Another consists of monstrous animals, birds, snakes, lizards, etc., of various kinds, generally extravagantly elongated, with tails, top knots, or tongues forming long interlacing ribbons, and intertwining together in the most fantastical manner. A number of spiral lines (2, 3, or 4) starting together from a central point, each of which, after several circumvolutions, goes off to another adjacent similar spiral, the direction taken by each line being constantly that of the letter C, and not scrollwise, like that of S.—The question is left untouched as to whence the early artists of these islands obtained

the very characteristic styles of ornament here described. Westwood, *On the Distinctive Character of the various styles of Ornamentation employed by the Early British, Anglo-Saxon, and Irish Artists,* printed in Archæological Journal, 1853, p. 275-301. Mortillet, *Le signe de la Croix, avant le Christianisme,* 8vo., Paris, 1866. Schliemann, *Troy and its Remains,* 8vo., London, 1875.

Ancient *Egyptian art* shows the fret or labyrinth, wave scroll, spiral, zigzag, water-lily or lotus, papyrus, star, and palm, and many others derived from the vegetable productions of the country, all treated conventionally, the scarabæus or beetle, and winged globe with asps, the vulture with the tau and ostrich feathers, the hawk, the winged asp, and the sphinx. The cartouche with hieroglyphics was a source of decoration. Davis, *Illustrations of Early Classic Ornament* (Greek, Assyrian, and Egyptian), in Building News *Journal,* 1868, xv, 604; xvi, 99; xviii, 228. Daly, *Revue Générale,* fol., Paris, 1857, xv, 67, 71. Prisse d'Avennes, *L'Art Egyptien,* fol., Paris, 1860.

The *Jewish* ornaments comprised the almond, pomegranate, palm tree, lily or lotus, oxen, lions, and cherubims: of these perhaps even now (1877) nothing is known except from the Old Testament.

In *Assyrian art,* the star, volute, chevron, bead and reel, patera, grooving and filleting, lions' feet, animals' heads, and the guilloche; the honeysuckle ornament also prevails, which is nowhere seen in Egyptian work, but was adopted by the Greeks. The cuneiform inscription was a source of decoration.

In *Greek art* occur the guilloche, scroll, and scroll of leafage, leaves, echinus or egg and tongue, running patterns of the honeysuckle, zigzag, fret, astragal or bead and reel, anthemions, lions' heads projecting from the upper molding, rosettes, animals and birds, figures and vases, with foliage, and chimeræ as in the friezes. The form of the foliage was absolutely conventional, and the form of the cutting of it was peculiarly sharp. Among the painted ornaments, the temple to Theseus had heart-shaped leaves, palm-leaf ornaments, honeysuckles, etc.; the Parthenon had the mæander and palm-leaf ornaments on the flat members; the Propylæum was decorated with different leaves, and the tendrils of the acanthus; the Ionic temple on the Ilissus had a palm-leaf ornament on the upper fascia of the architrave. Davis, *Illustrations* (Greek and Etruscan), in Building News *Journal,* 1871, xix, 470.

In *Roman art,* the honeysuckle no longer retained its separate treatment, but was mixed with foliage, and consequently a bolder system of enrichment was produced: festoons were overloaded with flowers; human and other figures appeared: the acanthus, laurel, vine, ivy, and honeysuckle were used; Daly, *Revue Générale,* fol., Paris, 1857, xv, 71. All foliage was more of a copy of nature than the Greek, and the cutting was more rounded. "The earliest architectural ornament carved in stone that is known in Rome is in the tomb of the Scipios, near the sarcophagus of L. Scipio Barbatus, who lived in the year 456 of Rome (B.C. 297)", Parker, *Archæology of Rome—the Walls,* 8vo., Oxford, 1874, i, 84.

In *Byzantine art,* the lily, cross, serpent, fish, and the scroll, of which the foliations terminated in lilies or leaves of three, four, or five blades, became a very prominent feature. All the imitations of natural forms were invariably conventional, and bore a close resemblance to the Grecian. The early crosses show a peculiar interlacing work.

In the *late Anglo-Saxon* period in England, as at Barnack Church, Northamptonshire, occur pateræ, and interlaced ornaments (also seen in the churches of Sta. Maria in Cosmedin, and S. Clemente, at Rome). The plain Greek cross is found on some coins of this period, and a laurel or palm branch bent in a spiral manner on one face of the coin occurs.

In the *Norman* period, the ornament commonly used is the chevron or zigzag, which is either single, duplicated, triplicated, or quadrupled: it was certainly not introduced until a long time after the commencement of the style. The next commonly used is the beak-head, *i.e.* heads of beasts or birds; and grotesque heads with their tongues or beaks lapping over a large bead or torus; also cat's head, bird's head, nail head, prismatic billet—alternate billet—square billet or corbel bole, indented, double cone, fir cone, pellet or stud, lozenge, cable, asterite or star, medallion, reticulated, rose, embattled fret, diamond fret, labyrinth fret, dovetail, semi-hexagonal, nebule, scalloped or (invecked) invected, hatched or saw-tooth wedge, studded trellis, foliated pateræ, and many others. Sharpe, *Ornament of the Transitional period* (1145-90), 4to., London, 1871.

In the *Early English* period, the ornaments are not numerous: the commonest and most characteristic is that called the tooth or dog-tooth ornament, usually consisting of four small plain leaves, sometimes worked as small bunches of leaves; other ornaments consist chiefly of single leaves and flowers, or of running patterns of the foliage peculiar to the style. The early work was extremely conventional, while for a short time the natural foliage prevailed. The scroll work was of a very beautiful character. Burges, *Conventional Ornament of the 13th Cent.,* printed in Builder *Journal,* 1859, xvii, 8-11: and in Building News *Journal,* 1858, iv, 1292, and plate.

In the *Decorated* period, the enrichment consists of varieties of leaves and flowers, either set separately or in running patterns, figures, heads, and animals, generally carved with greater truth than at any other period; shields, and fanciful devices; and the ball-flower belongs especially to this style, although a few examples are to be found of an earlier date. Crumpled leaves are peculiar to this period.

In the *Perpendicular* period, the ornaments are running patterns of foliage and flowers; detached leaves, flowers, and bunches of foliage, all of a square outline; heads, animals, and figures usually grotesque; shields, heraldic and fanciful devices.

In *French art,* the Romanesque comprised the same ornaments as those in England, but often of a more classic character. During the Transition period, the scroll work was finely combined with animals and thick leafage; notchings, and chevrons, etc. In the thirteenth century, were used the dog's tooth and rosettes; the gargoilles being larger than of the earlier period and more nearly resembling nature. The fourteenth century continued the fine work of S. Louis of the previous period, the ornaments are also chaste, simple, and pure, and in larger number: while those of the fifteenth century are still more numerous, but thinner and poorer, the extremities of the leaves ending in very sharp and lengthened points, with great hollows, deep holes, the crispings very strong, largely projecting and twisted. Viollet-le-duc, *Dict.,* s. v. Daly, *Revue Générale,* fol., Paris, 1857, xv, 71. In the Louis quatorze period (1643-1715) the elements are classical; with the constant and peculiar combination of the scroll and shell in the later years of the reign. The Louis quinze (1715-74) was merely the exaggeration of the characteristic elements of the later part of the previous period, the foliations of the scroll very much elongated, a random dispersion of the scroll and shell mixed with that peculiar crimping or shell work, the *coquillage,* ending with a disregard of the masses, and hence a mere mass of vagaries of indescribable forms; while the *rococo* was displayed in the production of the *bizarre* in ornament.

In *Moresque art* (after 634), scarcely found except in north-west of Africa and Spain (its style is different in details from the more Eastern Arabic work), the conditions of the Mahommedan law were stringent; no image of a living thing, vegetable or animal, was permitted; but this law was not strictly adhered to, as noticeable in the Courts of the Lions at the Alhambra; and perhaps elsewhere. Flat curves and angles or interlacings, also distinguished by variety of colour;

the curves falling into standard forms and floral shapes, and the lines and angles developed into a characteristic species of tracery or interlaced strap work, diversified by the introduction of inscriptions in the Arabic characters. The crescent, the emblem of Byzantium as seen on many of its coins, is not found in any early Moresque work, perhaps not until the capture of Constantinople, 1453. The projections were formed by honeycombing or CORBEL WORK.

In modern *Italian art*—in the period distinguished by the name of the *trecento* (1300-1400)—the great features are tracery or interlacings, and delicate scroll work of conventional foliage, without the symbolism of the Byzantine and Saracenic art. During the *quattrocento* (1400) classic forms of simple natural imitations of fruit, flowers, birds, or animals, became prominent, all disposed simply with a view to the picturesque or ornamental; subsequently cartouches or scroll shield work appears, and imitations of the grottesque work of Rome and Pompeii were introduced. During the *cinquecento* (1500), the grottesques and arabesques of Raffaello and his school were prominent.

The peculiar style of *Japanese art*, consisting of flowers, leafage, and strange forms, is shown in BUILDER *Journal*, 1863, xxi, 308, 364, 423; BUILDING NEWS *Journal*, 1869, xvi, 527; and xviii, 151; and AUDSLEY, *Japanese Art*, fol., Lond., 1876.

In *Chinese art* are included animals and birds, chiefly as grotesques, especially the dragon; flowers, fretwork, crinkums, insects, vases, geometric and flowing patterns, in which the Chinese characters also act as ornament. In modern art are seen modern European ornaments and architecture, greatly debased. OWEN JONES, *Examples of Chinese Ornaments*, 4to., Lond., 1866.

In *Indian art*, the human figure, representations of the deities, and the animal and vegetable creation are largely introduced. The honeysuckle, bead and reel, lions, and birds occur in the middle of the third century B.C. The gateways of the Sanchi tope and its stone railing exhibit a profuse amount of ornamental sculpture, cir. 250 B.C. Later came the use of numerous fillets and bands, with or without chevrons, diamonds and sculpture between. At Karli, 1st cent. A.D., the columns have a richly ornamented capital, on which kneel two elephants, each bearing two figures. Elsewhere appear a scroll intermixed with flowers, carved discs introduced where the form of the shaft changes from a square to a figure of sixteen sides: the porch of Vimala Sah on Mount Aboo, dating about 1032, is covered, pillars and roof, with carving of extreme beauty of detail and diversity of design. FERGUSSON, *Indian Architecture*, 8vo., London, 1877.

A plate of modern Indian ornament, by O. W. Davis, is given in BUILDING NEWS *Journal*, 1870, xviii, 480.

In *Mexican art*, the human figure and grotesque forms of animal life predominate; with fretwork. BUILDING NEWS *Journal*, 1873, xxiv, 445, and plate. CATHERWOOD, *Ancient Mons.*, fol., Lond., 1844. WALDECK, *Voyages*, fol., Paris, 1838.

The following are some of the useful stray papers hereon:—JENKINS AND HOSKING, *Selection of Architectural, etc., Ornt., Greek, Roman, and Italian*, fol., Lond., 1827. CLERGET, *Lettre sur l'Ornement*, in DALY, *Revue Générale*, 1841, ii, 210-4, gives a summary of his observations which he had made upon the series, *bien incomplète*, of the collections of ornaments which he had examined. LENOIR, *Histoire de la Sculpture d'Ornement en France*, in DALY, *Revue Générale*, 1841, ii, 225, etc. WORNUM, *Analysis of Ornament: Characteristics of Styles; an Introduction to the Study of Ornamental Art*, 8vo., London, 1856, with cuts. SEDDON, *Ancient and Modern Ornament Contrasted*, printed in BUILDER *Journal*, 1858, xvi, 70; 109. SMIRKE, *On Ornament*, Lecture at the Royal Academy of Arts in London, printed in BUILDER *Journal*, 1859, xvii, 168; 191. HULME, *Principles of Ornamental Art*, 4to., Lond., 1875.

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Publications on the various styles of decorative ornament are given in the following lists of selected books. The * to some publications intimates coloured plates. The student is also referred for others to the various *styles* of architecture, and the names of the chief *cities* and *places*, in this Dictionary: also to the following *articles* as distinct subjects. ARABESQUE; COLOUR; DECORATION; DECORATIVE; FRESCO PAINTING; FURNITURE; GROTTESQUE; ICONOGRAPHY; INLAY; METAL-WORK; PAINTING; PAINTED GLASS; PAVEMENT; POLY-CHROMATIC WORK; STAINED GLASS; SYMBOLISM; VASE.

Also to ACANTHUS; BALL-FLOWER; DOG-TOOTH; FLEUR-DE-LIS; LOTUS; MÆANDER, etc., as well as to the names of the various mouldings.

ANTIQUE AND CLASSIC.

BEAUVALLET and NORMAND, *Fragmens d'O. dans le style Antique*, 71 pl., fol., Paris, 1820. *ZAHN, *Ornamente aller Klassischen Kunstepochen*, 100 pl., 4to., Berlin, 1843-9. *PENROSE, *Ornaments of the Parthenon*, 41 pl., fol., Lond., 1851-2. TATHAM, *Etchings—Greek and Roman*, 101 pl., fol., Lond., 1825; 126 pl., fol., Lond., 1843. VULLIAMY, *Examples of Ornamental Sculpture—Greece and Italy*, 41 pl., fol., Lond., 1821. JENKINS and HOSKING, *Selection of Architectural and other Ornaments, Greek, Roman, and Italian*, 25 pl., fol., Lond., 1827. MOREAU, *Fragmens et Ornemens d'Arch. dessinés à Rome*, 36 pl., fol., Paris, 1800-2. AGLIO, *Collection of Cups, Friezes, Roses, etc.*, 4to., Lond., 1820. ANTONINI, *Manuale di varii Ornamente*, 4 vols., 4to., Rome, 1777-81. BIANCHI, *Fregi d'Architettura*, 48 pl., fol., 1645. COTTINGHAM, *Collection of Architectural Ornaments from Stuart's Athens, etc.*, fol., Lond., 1824. GANDON, *Collection of Antique and Modern Ornament*, 4to., Lond., 1778. PIRANESI's works, 29 vols., fol., Rome, 1750-85; 1835-7. REDMAN, *Ornaments from the Antique*, 21 pl., Lond., 1820. WIGHTWICK, *Selection of Vases, Chairs, etc., from the Vatican*, 4to., Lond., 1837. BOTTICHER, *Art of the Greeks in its relation to the Beautiful in Architecture and in the Industrial Arts*, 4to., and fol., Potsdam, 1852-53. ALBERTOLLI, *Fregi trovati—del foro Trajano*, fol., Milan, 1824; 1838. KÖNIGL. TECHNISCHEN DEPUTATION FÜR GEWERBE, *Vorbilder für fabrikanten und handwerker*, 4to., and fol., Berlin, 1821-37; and *Vorlegeblätter für maürer*, fol., Berlin, 1830. *GROPIUS and LOHDE, *Archiv für Ornamentale Kunst*, fol., Berlin, 1874. POPPE, *Sammlung von Ornamenten, etc. —durch Griechenland, Italien und Sicilien aufgenommen*, fol., Berlin, 1843-45. HOLZ, *Details Griechischer Haupt.-Gesimse*, fol., Berlin, 1854.

EARLY AND MEDIÆVAL, ETC.

*COLLING, *Gothic Ornaments of Great Britain*, XIII-XV cents., 209 pl., 4to., Lond., 1848-56; and *Examples of English Mediæval Foliage*, xii to xv cents., 4to., Lond., 1872. *PUGIN, *Glossary of Ecclesiastical Ornament and Costume*, 73 pl., 4to., Lond., 1844: 3rd edit. 1868. *WESTWOOD, *Miniatures and Ornaments of Anglo-Saxon and Irish Manuscripts*, fol., Lond., 1868. PUGIN, *Gothic Ornaments (from England and France)*, 96 pl., 4to., Lond., 1828-31. HEIDELOFF and GORGEL, *Les Ornements du Moyen Age*, 144 pl., 4to., Nuremburg, 1843-52. ADAMS, *Recueil de Sculptures Gothiques*, xi to xv cents., 192 pl., 4to., Paris, 1856. BECKER and HEINER-ALLIN[G], *Kunst[illegible] Geräthschaften des Mittelalters und der Renaissance*, 210 pl., fol., Frank., 1857-59. CRAMER, *Ornements du Moyen Age en Italie et en Sicile*, 4to., Ratisbon, 1842. UNGEWITTER, *Sammlung Mittelalterliche Ornamentik in Geschichtlicher*, fol., Leipzig, 1863. ZACH, *Ornements d'Architecture du Moyen Age d'Angleterre et de France*, 4to., Munich, 1842. *WARING, *Arts connected with Architecture, XIII to XV cents., in Central Italy*, 41 pl., fol., Lond., 1858. COTTINGHAM, *Working Drawings of Gothic Ornaments from the best Examples*, fol., Lond., 1824. DAVIS, *Gothic Ornaments from Prior Bridé's Oratory at Bath*, fol., Lond., 1834. FERGUSON, *Howth Cromlech, and Celtic*

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Bisson, *Choix d'Ornements Arabes de l'Alhambra*, Phot., fol., Paris, 1854. *Girault de Prangey, *Choix d'Ornements Moresques*, fol., Paris, 1847. Hessemer, *Arabische und Alt-Italienische Bau-verzierungen*, 120 pl., fol., Berlin, 1842; 1853, 2nd edit. *Bourjoin, *Les Arts Arabes*, etc., fol., Paris, 1868-70. *Prisse d'Avennes, *L'Art Arabe*, fol., Paris, 1870. *Owen Jones, *Alhambra*, fol., Lond., 1838-42.

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Normand, *Guide de l'Ornemaniste*, 36 pl., fol., Paris, 1826. Salandri, *Architectural and Ornamental Specimens of Italian Ornaments*, 48 pl., 4to., Lond., n. d. *Adams, *Polychromatic Ornaments of Italy*, 4to., Lond., 1847. Magazzari, *Raccolta de' più scelti Ornati sparsi per la città di Bologna*, 4to., Bol., 1827. Albertolli, *Corso Elementare di Ornamenti Architettonici*, 28 pl., fol., Milan, 1805. Antonelli, *Collezione di migliori Ornamenti Antiche nella Città di Venezia*, 130 pl., 4to., Venice, 1831. Baldus, *Recueil d'Ornements d'après les maitres des XV au XVIII siècles*, 100 pl., fol., Paris, 1866 69. Basoli, *Raccolta di Diversi Ornamenti*, 100 pl., fol., Bologna, 1838. Le Pautre, *Œuvres d'Arch.*, fol. Paris, 1751; and Decloux et Doury, *Collection*, etc., fol., Paris, 1854. Petit, *Nouveau Portefeuille de l'Ornemaniste*, 50 pl., fol., Paris, 1864. Scott, *The Ornamentist; Designs selected from the Works of Dietterlin, Berain, etc.*, 4to., Edinb., 1845. Cauvet, *Recueil d'Ornemens à l'usage des jeunes artistes qui se destinent à la Decoration des Batimens Louis XIV*, fol., Paris, 1757. Bernard, *Recueil d'Ornements de la Renaissance*, 30 pl. Bossi, *Opere Varie Ornamentale*, etc., 193 pl., fol., Parma, 1772. Hopkins, *Scrap book of Elizabethan Art*, 4to., Lond., (1840.) Shaw, *Details of Elizabethan Architecture*, 60 pl., 4to., Lond., 1839. Lefuel, *Palais du Louvre et des Tuileries*, fol., Paris, 1870. Lienard, *L'Ornementation au XIX siècle*, fol., Paris, 1866. Dury and Caulo, *Recueils d'Ornements de differents maitres*, 55 pl. Vallardi, *Elementi di Ornato*, 24 pl., 4to., Milan, 1834. Watteau, *Ornaments Complete*, by Nichols, fol., Lond., 1839-40. Imbard, *Ornements et Fragments d'Arch.*, 24 pl., fol., Paris, 1817. Pesenti, *Ornements d'Architecture*, Cinque cento, 4to., Rome, n. d. Berain, *Collection of Ornamental Designs*, Cinque cento, Renaissance, and Louis XIV, 137 pl., fol., Paris, cir. 1670-1700. Wornum, *Catalogue of Ornamental Casts* (Renaissance) *at South Kensington Museum*, 8vo., Lond., 1854. Bergamo (S. de), *Gli ornati del Coro della Chiesa di S. Pietro di Perugia*, fol., Rome, 1845. Borsato, *Opera Ornamentale*, fol., Milan, 1831, with additions, fol., Venice, 1848.

General and Late.

*Owen Jones, *Grammar of Ornament*, 112 pl., fol., Lond., 1856; and republished 4to., Lond., 1865-66; and transl., *Grammatik der Ornamente*, 4to., 1868. *Jones, *Chinese Ornament*, 4to., Lond., 1866. Reynard, *Ornements des Anciens Maitres du XVe au XVIIIe siècle*, 220 pl., fol., Paris, 1846. *Metzmacher, *Portefeuille Historique de l'Ornement*, 32 pl., fol., Paris, 1841-43. Shaw, *Encyclopædia of Ornament*, 59 pl., fol., Lond., 1842. *Libri, *Monumens Inedits ou peu Connus—qui se rapportent à l'histoire de l'Ornementation*, 2nd edit., 65 pl., fol., Lond., 1864. *Cundall and Macquoid, *Examples from Works of Art at Marlborough House*, 280 examples of all styles, fol., Lond., 1855. Marshall, *Handbook of Engravers of Ornament*, Lond., 1869. Kallenbach, *Technisch Bibliothek für Kunstler und Handwerker*, 4to., Munich, 1852. *Racinet, *L'Ornement Polychrome, XVII* and *XVIII* cents., 100 pl., fol., Paris, 1870-72. *Eisenlohr, *Ornamentik*, etc., 54 pl., Leipzig, 1851. Government School of Design *Drawing Book*, fol., London, 1842-3. Salembier, *Principes d'Ornemens pour l'Architecture*, 40 pl., 4to., Paris, n.d. Metzger, *Ornaments designed from Flowers, for Architects, Decorators, etc.*, fol., Munich, 1872. Penor, *Ornementation usuelle de toutes les Epoques dans les Arts Industrielles*, fol., Paris, 1867-68. Romagnesi, *Recueil d'Ornemens en Sculptures*, fol., Paris, 1843. Rottman, *Ornaments from the Interiors of celebrated Buildings at Munich*, fol., Munich, 1849. Colling, *Art Foliage for Sculpture and Decoration*, 72 pl., 4to., Lond., 1865. Wornum, *Analysis of Ornaments; Characteristics of Styles*, 8vo., Lond., 1856. Zahn, *Auserlesene Verzierungen, etc.* (a drawing book for schools), fol., Berlin, 1844. Zanetti, *Studj Architettonico-Ornamentali*, fol., Venezia, 1845. Page, *History of Ornaments, and Guide for Drawing the Acanthus*, 60 pl., 8vo., Lond., 1839. Plantard et Peyre, *Recueil d'Ornements d'après les plus beaux monuments d'Arch. et de Sculp.*, fol., Paris, 1844. Desflorennes, *Recueil d'Ornements, tirés des anciens maîtres allemands, français, etc.*, fol., Paris, 1840-43. Bilordeaux, *Cour de Dessin pour l'Ornement*, 96 pl., fol., Paris, n.d. Bilordeaux, *Etudes d'Ornements aux deux crayons*, 78 pl., fol., Paris, n.d. Chenavard, *Album l'Ornemaniste, recueil composé de fragments d'Ornemens dans tous les styles, etc.*, 72 pl., fol., Paris. Schmidt, *Cours élémentaire du dessin d'Ornemens, etc.*, 27 pl., fol., Paris, n. d. Daly, *Motifs historiques d'Architecture et de Sculpture, d'Ornement, etc.*, 2 ser., fol., Paris, 1870. Clerget, *Encyclopédie d'Ornement*, fol., Paris, n.d. *Clerget, Dupuis, et Breviere, *Motifs d'Ornemens du XVI siècle*, 18 pl., 4to., Paris, 1840. *Clerget and Leconte, *Mélanges d'Ornements, ou, Variété ou Choix d'Ornements, XVIe au XVIIIe siècles*, 72 pl., fol., Paris, 1838. Clerget et Reister, *Ornements tirés des quatre Ecoles, du XVe au XIXe siècle*, 410 pl., 4to., Paris, 1835-41. Knight, *Cyclopædia of Ornament*, 4to., Lond. (1869). Newbury, *Ornamental Art; Gleanings from a thousand examples of all styles*, 4to., Lond., 1863. Robinson, *Architectural Foliage adapted from Nature*, 36 pl., 4to. Weitbrecht, *Ornamenten Zeichnungs-Schule*, fol., Stuttgart, 1853; 1852, 2nd edit. Polisch, *Etudes d'Ornemens de differens styles*, 12 pl. Titz, *Architectonische Ornamente*, fol., Berlin, 1847-8. Ballantine, *Ornamental Art, as applicable to Trade and Manufacture*, 40 pl., fol., Edinb., 1847. Domschke, *Drawing-book of Architectural Ornaments for the use of Schools*, etc., 4to., Berlin and Lond., 1840. Hulme, *Freehand Ornament*, 60 outline examples, 8vo., Lond. (1871). *Dresser, *Studies in Design*, fol., Lond., 1874-76.

ORNAMENTAL ART. That peculiar branch of art which is entirely applied to decorative purposes, and does not devote itself to figures or landscapes, except as incidental accessories. Papworth, *Benefits resulting to the Manufactures of a Country from a well-directed Cultivation of Architecture, and of the Art of Ornamental Design*, paper read at the Institute of British Architects, *Transactions*, 4to., Lond., 1835, i. O'Neil, *On Ornamental Art*, printed in Building News *Journal*, 1870, xviii, 120; 145. Crace, *Ornamental Features of Arabic Architecture in Egypt and Syria*, read at Royal In-

stitute of British Architects, 1870-71, and BUILDING NEWS *Journal*, 1870, xviii, 86. GRUNER, *Specimens of Ornamental Art—best models of the classical Epochs*, 80 pl., fol., London, 1850. ZERFFI, *The Historical Development of Ornamental Art*, Forty Lectures at the South Kensington Museum, from Oct. 1870, reported in the BUILDING NEWS *Journal*: the seventh course was commenced Oct. 1875; B. N. *J.*, xxix, 445: and published 8vo., Lond., 1876. ZERFFI, *Historic Art Studies*, B. N. *J.*, 1873, xxiv, 373, and xxv, passim.

ORNAMENTAL GARDENING. The system of laying out a limited plot of ground into forms either geometrically (ITALIAN GARDEN) or naturally, and varied according to circumstances, and so called in contradistinction to LANDSCAPE GARDENING. Some idea of the town gardens of the Romans may be obtained from the paintings at Herculaneum and Pompeii, destroyed A.D. 79; the largest, however, did not exceed a quarter of an acre in extent. The garden attached to the house of Pliny, and described by him, is restored in the work by FELIBIEN, 1699, and in that by CASTELL 1728; its style gave the tone to European taste up to the end of the seventeenth century, as noticed by FALCONER in 1785; the description mentions terraces adjoining the house; the lawn declining thence; a small flower garden with a fountain in the centre; the walks bordered with box, the trees sheared into whimsical forms; besides fountains, alcoves, and summer-houses. Horace WALPOLE, 1778, remarks that "all the ingredients of Pliny's garden correspond exactly with those laid out by Loudon and Wise on Dutch principles; so that nothing is wanting but a *parterre* to make a garden in the reign of Trajan serve for the description of one in the reign of king William III". The geometric and architectural styles of gardening were adopted in *Italy* because the elements are common everywhere in the natural scenery of that country (ITALIAN GARDEN): and this introduction of statues and urns in gardens, was soon imitated by Francis I in France. VOLCKAMER in 1690 represents the Italian gardens as inferior to those of France in point of superb alleys, lofty clipped hedges and cabinets of verdure: among those in Italy he includes the Venerie, Stupigni, and Vigna della Regina, near Turin. The gardens of the Isola Bella, 1640; and the Boboli gardens at Florence; that at Monza; the Borghese, Panfili, d'Este, and other villas at Rome; PERCIER, *Maisons de Plaisance*, fol., Paris, 1809; and that at Caserta near Naples, are among the best examples. The gardens of the villa Pallavicini, at Pegli near Genoa, have been laid out on the side of a hill at an enormous expense. About the middle of the eighteenth century the English style began to attract attention in Italy.

The characteristics of both the *Dutch* and French taste in gardens are symmetry and abundance of ornaments, but the former are more confined, and covered with frivolous ornaments, and more intersected with still and muddy pieces of water. HARRIS, 1699, describes the different portions of the gardens at Loo, laid out from the designs of Marot, as having slopes of turf crowned with cut junipers, basins of water, parterres containing figures in box with beds of flowers, hedges of Dutch elm about 4 feet high, etc.; wooden trellis work, props, etc., painted green, the iron work blue, and ornaments gilt: LE ROUGE, 1787-90, gives the garden of the count de Nassau, which represents a style no longer to be seen in such perfection in any country. The gardens of the palaces at the Hague were "full of ornaments, close walks, statues, marbles, grottoes, fountains, and artificial music"; EVELYN, 1641: Sir J. E. SMITH, *Tour on the Continent*, 1783, i, in describing them, states that one garden was full of serpentine, the other as full of straight, lines. VANDER GROEN, 1672, gives plates of four bird's-eye views of houses with gardens in front, many "models" for parterres (like geometric tiles), for trellis work, for clipping trees into shapes, and for other garden ornaments.

In *France*, at the beginning of the seventeenth century, HIRSCHFELD, 1770-71, shows that the gardens consisted only of a few trees and flowers, with some plots of turf and pieces of water. EVELYN, visiting France in the second year of Louis XIV's reign (1644), notices the gardens of the Tuileries, S. Cloud, of cardinal Richelieu at Ruelle, of S. Germain, and of the Luxembourg. Those at Ruelle, he states, "are so magnificent that I doubt if Italy has any exceeding them for varieties of pleasure". All the above were among the many productions of Le Nôtre, and though there certainly was nothing in his manner that had not been already displayed in France and Italy, and, with the exception of parterres, even by the Romans, yet the grand scale and sumptuous expense of his plans surpassed everything before seen in France. His long clipped alleys, triumphal arches, richly decorated and highly wrought parterres, the fountains and cascades with their grotesque and strange ornaments, the groves full of architecture and gilt trellises, and profusion of statues and thermes; all these wonders springing up in a desert-looking country, dazzled and enchanted every class of observers. DU FRESNOY succeeded him, but preferred unequal surfaces, as are shown in those of abbé Pajot near Vincennes, and in two in the faubourg S. Antoine afterwards known under the names of Moulin and Chemincreux. Marly was the design of the architect Drusé, controller of the works at S. Germain. Bagnolet is the principal work of Desgodetz: and the brothers Mansart designed several gardens in the style of Le Nôtre. In 1762 the English style began to pass into France, befriended by LAUGIER, *Essai sur l'Arch.*, 1753, and by PRÉVOT, *Homme du Goût*, 1770.

The nobles of *Germany* introduced miniatures of Versailles, Marly, and Trianon. Near Vienna, the gardens of Schönbrunn were laid out in 1696 from the designs of Fischer of Erlach, and enlarged 1775-80 by Steckhoven, a Dutch artist; also the gardens of Laxenburg belonging to the emperor. Gardens at the Belvedere palace are laid out in this style. The garden of Baron Hügel at Hietzing near Vienna has a "rococo garden" formed of beds, turf, gravel walks, statues, etc. The old gardens of Sans Souci near Potsdam are in the mixed style of Switzer, with every appendage and ornament of the French, Italian, and Dutch taste. Manger, a German architect, and Salzmann, the royal gardener, have described their works there. The extensive gardens of the palace (erected 1763-67) of Ludwigsburg, in Würtemburg, are principally laid out in the geometric style. The gardens at Schwezingen between the Rhine and the Main, belonging to the grand duke of Baden, were considered by KRAFFT, 1809-10, to be the most delightful in Germany; they appear to carry out the French taste upon a grand scale. The palace gardens at Carlsruhe, laid out 1715 by Berceau of France, had in the parterres curious patterns strewed with different coloured sands, broken glass, porcelain, shells, etc., the walks bordered by box, yew, and hornbeam hedges, since destroyed. The park was laid out with avenues on the radiating principle. The gardens at Wörlitz near Dessau were considered by the prince de Ligne to be the first in Germany. They are divided into five gardens, not all geometric, a description of which covers five pages of small print in LOUDON, *Encyc.* The gardens at Charlottenhof near Potsdam, were laid out by Schinkel for Fred. William IV when crown prince.

At Fredricksburg near Copenhagen, in *Denmark*, the pleasure garden was originally laid out in the Dutch manner, but altered for that of the English by M. Voigt, about 1830; it is now one of the most celebrated in Denmark. In *Sweden* Charles XII procured plans from Le Nôtre, and had the trees and plants sent from Paris. In *Russia*, the emperor Peter the Great's first effort was the garden, 1714, of the summer palace at S. Petersburg, laid out in the Dutch taste. But the grandest and most superb garden in the geometric manner, is that which he constructed soon afterwards at Peterhof; the

whole was designed and laid out by Le Blond, a pupil of Le Nôtre. In *Poland*, the most ancient royal garden in the geometric manner is that of the elector de Saxe, but never completed; that called Kraszinski is another; the most remarkable is that called Lazienki (the Bath) formed 1764 at Ujasdow, a suburb of Warsaw, by Camsitzer, a German artist. Villanov near that city is a private garden belonging to count Stanislas Potocki. At Cracow are the remains of one laid out by marshal Loudon, and two others.

In *Spain*, the gardens are of a more mixed character; but the old garden of the Alcazar near Seville, laid out by the Moors, still retains the walks paved with marble, and parterres laid out with evergreens and shaded by orange trees; with many baths and marble fountains supplied by an aqueduct. Another exists at Granada, covered with wood cut into straight and winding walks interspersed with fountains. Those of the Escurial at Madrid, of Ildefonso near the city, and of Aranjuez near Toledo, have terraces, stairs and fountains, the garden being formed by the intersection of alleys with statues, trellis work, etc.: at the latter place are canals on each side of the avenues. El Retiro, near Malaga, the seat of count Villalcazar, the garden is laid out with straight cypress walks, having lakes, fountains, and waterworks, the trees and shrubs being cut into curious shapes, etc. In Granada, Valencia, Barcelona, and Tarragona the same general description of gardens occurs, the modern style of gardening not having been introduced (1830), or not to any extent.

A plan of the Sultan's garden at *Constantinople* is given by Krafft, from which little can be gathered but that it abounds in trees and buildings all surrounded by a great wall. Further reference to Eastern gardens is unnecessary, excepting to that at Agra.

In *England*, among the early attempts at geometric gardens, was that at Hampton Court, having a labyrinth still existing. During Elizabeth's reign, Hatfield was laid out, the gardens being surrounded by a piece of water allowing boats thereon, in alleys of well-cut trees; also labyrinths, jets d'eau, summer houses, and fishponds: knots and mazes were formed. Theobalds, about 1640, had a large walled square court with a fountain in the centre; a parterre with pleasant walks, partly planted with espaliers and partly arched over. Lord Bacon attempted to reform the taste; he kept the shorn trees and hedges, proposed winter or evergreen gardens, abused the knots or figures, and images, cut out in juniper or other garden stuff. Oxnead Hall has a fine specimen of a garden of this age. For Charles I, Le Nôtre planted Greenwich park and old St. James's park; the semi-circle at Hampton Court was begun. Chatsworth was laid out, perhaps by Rose, who had visited Versailles; it was cut up into oblong spaces, each being laid out in paths according to its purpose. Cashiobury had walks, ponds, and other rural elegancies. Hampton park, Middlesex, had rows of lime trees planted, and a canal; in the garden, fountains, statues, and a parterre with a banqueting-house over a cave or cellar. At Wanstead house, Essex, the gardens were planted with walnut trees, and fishponds formed. At Longleat, vegetable sculptures and embroidered parterres were in their highest vogue. In king William's time, knots of flowers, curious edgings of box, topiary works, grassy slopes, and other characteristics of the Dutch style came into notice, in England as well as in *Ireland*, where some gardens in that style still exist. Queen Anne finished the old gardens at Kensington under the direction of Wise, who laid out Blenheim: London laid out those at Wanstead and at Edger: and Bridgeman, their successor, banished vegetable sculpture, introducing wild scenes as at Richmond park, but the alleys were still clipped, though the central parts were left untouched; Kent succeeded him, and introduced the modern or natural style, as at Stowe, Woburn farm near Weybridge, Pain's Hill, Hagley, South Lodge, the Leasowes, Claremont, and Esher.

About 1750 was introduced the fashion of Chinese gardens and decorations.

The study of rural improvement passed through several stages of practice. Men of taste laboured to introduce natural scenery, and when the stately formalities of style in the architectural arrangement of the mansions at the time when the Italian practice after the designs of Palladio were adopted, had been removed, the introduction of another style occurred in which the chief apartments were placed on the ground floor, and eventually the offices were dismissed to the rear, and "planted out", as it is called, so that the house alone was visible to the observer. This was L. Brown's manner. The grounds at this time were surrounded by plantations called "the belt"; and the park, so termed, if of sufficient extent to preserve deer, was spotted over by round masses of trees called clumps—this manner pleased for awhile. *Ornamental gardening* had now proceeded so far as to be established successfully against the prejudices in favour of the older styles, and the field was open to unrestrained improvements, which since they were no longer to be expected from the linear and systematic practice, were judiciously sought for in nature. Repton, when he commenced his practice, perceived that nature and art required to be blended together with more propriety and grace than was exhibited in the former systems. Hence the introduction of the English pleasure grounds, and the "English garden" became a model imitated by every country in Europe; Papworth, *Hints on Ornamental Gardening*, 8vo., Lond., 1823. The Italian garden again commenced to be fashionable, when a sunk flower garden with an orangery was formed for George IV about 1824 at Windsor Castle; the gardens at Trentham were reformed by Sir C. Barry; and this arrangement is elaborated at the Horticultural Gardens at South Kensington, wherein a maze was designed by S. Smirke, R.A.; and, for a portion of the grounds, is contrived in many private gardens.

Loudon, *Encyclopædia of Gardening*, etc., 8vo., London, 1850, gives a large number of illustrations of gardens of the above description, and from which much of the above account is condensed.

Crescenzi, *Opus Ruralium Commodorum, etc.*, fol., Augsburg, 1471. Androuet du Cerceau, *De Architectura opus*, fol., Paris, 1559. Hyll, *Profitable Art of Gardening*, 4to., 1574; 1608. Ens, *Magnæ Britannicæ Deliciæ*, 8vo., Cologne, 1613. Rathborne, *The Surveyor*, fol., 1616. Andreini, *L'Adamo*, 4to., Milan, 1617, a poem with prints of gardens. S. de Caus, *Hortus Palatinus* (Heidelburg), fol., Frankfort, 1620. Anon., *Le jardin du roy Louis XIII*, fol., 1623. Boyceau, *Traité de Jardinage*, 62 pl., fol., Paris, 1638. Furtenbach, *Architectura Recreationis*, fol., 1640. Mollet, *Le jardin de plaisir, plusieurs desseins de jardinage*, fol., Stockholm, 1651; and *Théâtre des plans—et jardins*, 4to., Paris, 1652. I. de Caus, *New and Rare Inventions of Waterworks*, translated by J. Leak, fol., 1659; 1704; and *Wilton Garden*, fol., n. d. *Les Délices de la Campagne*, 12mo., Amst., 1661. Böckler, *Architectura Curiosa Nova*, fol., Nur., 1664-1701. Meunier, *Vues des palais et jardins de plaisance des rois d'Espagne*, fol., 1665. Van der Groen, *Le jardinier du Pays Bas*; and Supp. 24 *modelles de parterres à la Françoise*, 4to, Bruxelles, 1672. Felibien, *Grotte de Versailles*, fol., Paris, 1672; 1675; 1679. Marot, *Le magnifique chasteau de Richelieu, etc., de ses avenues*, etc., 4to., Paris, 1674. Meager, *English Gardener, or Sure Guide*, 8vo., 1683; Falda, *Li Giardini di Roma*, fol., 1683; 1693. Wolfe, *Gardens and Palaces of France and Germany*, fol., ..., 1690. C. d'Aviler, *Cours d'Architecture*, 4to., Paris, 1690; and various later editions. De la Quintinye, *The Complete Gardener*; transl. from the French; abridged and improved by G. London and H. Wise; edited by J. Evelyn, 8vo., 1693. Kip, *Britannia illustrata*, 4 vols., 312 pl., fol., Lond., 1697-1715; and *with Scotland*, 385 pl., 1724-38. Heré de Corny,

Recueil des plans, etc., des chateaux, jardins, etc., en Lorraine, fol., 1698. Felibien, *Plans, etc., de la maison de Campagne de Pline, consul*, etc., 8vo., Paris, 1699. Harris, *The palace and gardens at Loo*, 4to., Lond., 1699. Fer, *Beautés de France*, fol., Paris, 1708. Le Blond, *Théorie et pratique du Jardinage*, 4to., Paris, 1709; transl. by J. James, 4to., 1712. Van Oosten, *The Dutch Gardener*, 8vo., 1710. Dezalier d'Argenville, *La théorie et le pratique du jardinage*, 4to., La Haye, 1711. Decker, *Furstlicher Baumeister, oder Architectura Civilis*, etc., fol., 1711-16. Lsaida, *Théorie et pratique du jardin*, 4to., 1713; 1747. Volckamer, *Nachrichten von Italien*, fol., Nur., 1715. Pfeffel, *Views of the palaces, gardens, etc., of Vienna*, 4to., 1715-33. Husson, *La Théorie et la pratique du jardinage*, 4to., 1715; 1739. Switzer, *Iconographia Rustica*, 8vo., 1718. Diesel, *Jardins et Maisons d'Allemagne et Bavarie*, obl. fol., Saltzburg, (cir. 1720). Kleiner, *Les maisons de plaisance impériale ou "favorite", de même les jardins de plaisance*, etc., fol., Vienna, cir. 1724. Kleiner, *Views of the chateau of Wissenstein, of Geubach, and others, with gardens, etc.*, fol., Augs., 1728. Langley, *New principles of Gardening; or the laying out Parterres, Groves, Labyrinths, Avenues, etc.*, 4to., 1728; (who praises the publications by Switzer and by James). Castell, *Villas of the Ancients*, fol., 1728. Blondel, *De la distribution des maisons de plaisance*, 4to., Paris, 1737-8. Lauritz de Thurah, *Le Vitruve Danois*, fol., Copenhagen, 1740. Galimard, *Architecture de jardins*, fol., Paris, 1750. Attiret, *Letter from Pekin*, transl. by J. Spence (under name of Sir H. Beaumont), 8vo., 1752. Reichart, *Land und Gartens Schatzes*, 8vo., Erfurth, 1753. Darly and Edwards, *Gothic designs for garden buildings, seats, etc.*, 4to., 1755. Chambers, *Designs for Chinese Buildings, etc.*, 4to., 1757; and *Plans, etc., of the Gardens, etc., at Kew*, fol., 1757.

The following publications are comprised within the periods of those given s.v. Landscape Gardening.

Neufforge, *Recueil d'Arch., des jardins, etc.*, fol., Paris, 1765. Jombert, *Les délices de Versailles et des maisons royales*, fol., Paris, 1766. Chambers, *Dissertation on Oriental Gardening*, 4to., 1772; 1773. Weston, *Catologue of Authors on Gardening*, 8vo., 1773. Morel, *Théorie des jardins*, 8vo., Paris, 1776. Le Rouge, *Collection de Jardins Angloise*, fol., Paris, 1776. Walpole, *History of Modern Taste in Gardening*, 8vo., Lond., 1778; 1782. Hirschfeld, *Theorie der Gartenkunst*, 5 vols., 4to., Leipzig, 1770-71; 1779-85. Girardin, vicomte d'Ermenonville, *De la Composition des Paysages, ou des moyens d'embellir la Nature autour des Habitations, etc.*, 8vo., Paris, n. d., Transl. into English, 12mo., 1783. Falconer, *Historical View of the Gardens of Antiquity*, 8vo., 1785. Joendel, *Les jardins Anglo-Chinois Français*, fol., 1786. Le Rouge, *Recueil, etc., des plus beaux jardins de l'Europe, etc.*, obl. fol., Paris, 1787-90. Walker, *Essay on the Rise and Progress of Gardening in Ireland*, in *Trans.* of Irish Academy, iv, 1790. Grohmann, *Ideen-Magazin; Recueil d'idées nouvelles pour la décoration des jardins et des parcs*, 450 pl., 4 vols., 4to., Leipzig, 1797-1802. Delille, *Les Jardins, ou l'art d'embellir les paysages*, 12mo., 1801. Czartoryska (princess Isabella), *Thoughts on the manner of Planting Gardens*, 4to., Warsaw, 1808. Krafft, *Plans des plus beaux jardins pitt. de France, Angleterre, et d'Allemagne*, fol., Paris, 1809-10. Damame-Demartrait, *Divers jardins et points de Vues des maisons de plaisance impériales de Russie*, fol., 1811. Hornor, *Delineating Estates; sketch of the progress of Landscape Gardening in England, and opinions on the picturesque effects attempted in Rural Improvement*, 8vo., London, 1813. Anon., *Description des principaux parcs et jardins de l'Europe*, 3 vols., 72 plates, fol., Vienna, 1812. (1) M., *Dissertazione su i giardini Inglese*, etc., 8vo., Verona, 1817. Royer, *Histoire de la Musée Royale d'Histoire Naturelle*, and transl., 8vo., Paris, 1823. Ramée, *Drawings, etc., of Seats, Picturesque Pleasure Grounds, and Gardens*, 13 pl., fol., Paris, 1823. Boitard, *Composition et de l'ornement du jardins—et des Machines pour élever les eaux*, 4to., Paris, 1825. Boitard, *L'art de composer et de décorer les jardins*, 4to. and fol., Paris, 1825; 1834. Johnson, *History of English Gardening*, 8vo., 1829. Anon., *Jardins de Versailles, vues tirés du parc de V., et de Trianon*, 16mo., Paris, 1847; 1850; 1855. Vivian, *Gardens of Rome and Albano*, fol., 1848. Panseron, *Jardins Anglais*.

Lecoq, *Parcs et jardins, prix de règlement, etc. Château royale de Ryswick*, 12 pl., 4to. *Vue générale de la maison, des jardins, et des plantages de la Seigneurie de Middagten*, 12 pl., fol. *Description du parc de Weimar, et du jardin de Tieffurth*, Erfurth, 1797. Lose, *Promenade dans les jardins de Monza*, 12mo., Monza, 1827. Husson, *Des Jardins et de leur rapports avec l'architecture*, in Daly, *Revue Générale*, 1849, viii, 118, 177. *Promenades ou Itinéraire des jardins d'Ermonville*, 8vo., Paris, 1788. *Promenades des jardins de Chantilly*, 8vo., Paris, 1791. Serle, *Plan of Pope's garden as left at his death, etc.*, 4to., 1745.

The following publications are later than most of those in the list given s. v. Landscape Gardening.

Lecoq, *Le Paysagiste; nouveau traité d'Arch. de parcs et jardins (école moderne);* plans of gardens by Grénier and O. Smith, fol., Paris, 1860. Alphand and Davioud, *Les Promenades de Paris; Les bois de Boulogne architecturale, etc.*, fol., Paris, 1860-7. Fenton, *Landscape and Cathedral Views*, phots., fol., Lond., 1860-64. Cundall and Downes, *English Flower Gardens*, phot., fol., 1861. Harding, *Picturesque selections of Landscape, Buildings*, etc., fol. (1861). Vacquer, *Bois de Boulogne architecturale*, fol., Paris, 1863. Wormann, *Der Garten-Ingenieur; handbuch der gesammten Terknik des Gartenwesens, etc.*, 8vo., Berlin, 1865. La Fougères, *Choix des espèces—décorations des jardins, etc.*, 8vo., Paris, 1867. Robinson, *Parks, Promenades, and Gardens of Paris*, fol., Lond., 1869.

ORNAMENTATION. The distribution and application of ornament. Fairholt, *Terms in Art*, 8vo., Lond. (1870), says it is a corrupt word of very modern invention. *Histoire de l'Ornementation*, in Daly, *Revue Générale*, fol., Paris, 1857, xv, 64-73.

ORNAMENTED ENGLISH ARCHITECTURE. A term used by Britton and some other writers, for that phase of mediæval architecture in England generally called the DECORATED PERIOD. It prevailed chiefly in the reigns of the kings Edward I, II, and III (1272-1377).

ORNITHON. An aviary. The Roman aviary was of two classes; 1, those for singing birds, and 2, those for profit, in which thousands of birds were confined and fattened. Varro, *De Re Rustica*, B. iii, ch. 3, 5 or 8, gives a description of one of his own; and Lucullus had a *triclinium* constructed in his Tusculan villa inside of an ornithon. Castell, *Villas of the Ancients*, fol., Lond., 1728, p. 19. A. de Segner, *De Ornithone Varronis;* and Goiffon, *Observations sur la Volière de Varron;* both reprinted by Schneider, *Script. Rei Rusticæ*, i, at end of commentary. Aviarium. 6. 78.

OROBITES COLOUR, see Chrysocolla.

OROMBELLI (Carlo), cir. 1788, made a design for the façade of Milan cathedral, at the same time as the sculptor Pagani, L. Cagnola, and G. Galliori in 1773. He was also appointed to the fabric from 1 June 1777 to end of 1796. 27.

OROZCO (Juan de), one of a junta of architects assembled 1513 by the bishop of Salamanca to report upon a plan for the cathedral; Street, *Gothic Arch. in Spain*, 8vo., Lond., 1865, p. 86. 66.

ORPHEUS, the son of Apollo and Calliope. He is always represented holding his lyre. 6.

ORPIMENT (Lat., Auri-pigmentum). The sesquisulphuret of arsenic. It is found in nature, and is artificially prepared by transmitting a stream of sulphuretted hydrogen gas through a solution of arsenious acid. Orpiment is of a fine yellow colour, and is the principal ingredient in the

pigment called King's Yellow. It is readily soluble in the pure alkalies, but insoluble in water and acids. Nitric acid and chlorine decompose it. Hooper, *Medical Dict.*, 8vo., Lond., 1848. It is also called chinese yellow, king's yellow, and yellow orpiment; and is also described as a yellow sulphuret of arsenic, and a yellow sulphide of arsenic. Orpiment, which is called *ἀρσένιχον* in Greek, is obtained from Pontus; Vitruvius, B. vii, c. 7. A broad-flaked gold-coloured kind, well known among the ancients (as described by Dioscorides), is found in the islands of the Archipelago, in the mines of Goffelaer in Saxony, in some parts of Turkey and of the East Indies; and in its utmost purity about Smyrna. 6.

ORREA. The ancient name of Perth in Scotland.

ORSENIGO (Paolino da), was employed as *magister a lignumine* from 21 Nov. 1406 on the works at Milan cathedral. 27.

ORSENIGO (Simone), who succeeded Marco da Campione, the first on the list of artists, was elected 6 Dec. 1387 chief engineer *(inzegnerius)* at Milan cathedral. He was dismissed, but reappointed 6 July 1388; N. de Bonaventure of Paris succeeded him. Orsenigo was, however, recalled and ordered 9 Nov. to return the drawings: and Bonaventure was dismissed 31 July 1391. 27.

ORSI (Bartolomeo) designed 1685 the porta Margherita at Cremona; rebuilt 1826 by L. Voghera. 57.

ORSI'S PATENT LAVA; see Metallic Lava.

ORSOLINO (Andrea), 1758, enlarged and modernized the large ospedale di Pammatone at Genoa, given in Gauthier, i, pl. 52-7.

ORTALI (Fabbrizio), is mentioned amongst the 21 architects who were called upon to give their advice upon the subject of a design for the façade of Sta. Maria del Fiore at Florence, 5 March 1635. *La Metrop. Fior. Illust.*, fol., Florence, 1820, p. 67.

ORTE (Ancient *Horta* or *Hortanum*). A town in central Italy, situated near Orvieto and Viterbo, on the river Tiber, over which are some ruins of a bridge called ponte di Augusto, the town being on the site of one of his military colonies. There are also extensive remains of Roman baths. It is the see of a bishop. The cathedral, under the invocation of the Assumption of the Virgin, was "magnificently rebuilt" for bishop Tenderini, and opened 1721. The church of S. Agostino has a good façade of the 15th cent.; that of S. Silvestro has a fine mediæval campanile: and that of S. Pietro is mentioned. Some of the oldest houses appear to have retained an Etruscan character in the doorways and windows, and in their solid stone construction. 28. 50. 96.

ORTEGA (Josef de) was a *maestro mayor* at the alcazar at Toledo 21 Aug. 1643; and at the cathedral from 24 August 1657, succeeding C. da Palencia. In consequence of bad health he was pensioned on full pay 18 June 1671, and died 3 Jany. 1673. 66

ORTEGA (S. Juan de), one of the best architects of his time, was born in 1080, in the village of Quintana Ortuño, two leagues from Burgos. In 1107 he was associated with Santo Domingo de la Calzada as companion and pupil, and with him built the bridge of Logrono over the river Ebro, and that of Nájera, over the Najerilla, which, after the death of Santo Domingo, S. Juan completed. He then became a priest. On account of the wars between the kings of Castille and Navarre, he distributed a great part of the estate, which he had inherited from his ancestors, amongst the poor, and went to Jerusalem to visit the holy places. He returned in a year, and built in the mountains of Oca, near the road to Santiago de Galicia, the hermitage of S. Nicolas de Bari, and a house near it for the convenience of pilgrims. He also built the church, as far as the transepts, of the monastery now called S. Juan de Ortegas, belonging to the Geronomite monks. As his fame spread, devotees came from all parts to seek his counsel and to follow his teaching, the most favoured remaining in his company, observing the rule of the hermits of S. Augustine. Always desirous to be of use to his fellow-men, he left the convent, and having seen many unfortunate persons perish from the want of bridges and causeways, he constructed some of the latter himself, as well as a third bridge; a causeway between the villages of Agés and Atapuerca, which district was impassable in winter on account of the morasses; another causeway from Atapuerca to his monastery of Ortega; and a small bridge near the village of Cubo. He died in his convent 2nd June 1163, and was buried in the chapel of S. Nicolas: his tomb was adorned with four columns in 1474. His effigy exists in a remarkable small chapel close to the bridge of Lograno. 3. 66.

ORTHOGRAPHY. The elevation of a building or any part of it, showing all the details in correct relative proportions. It is either external or internal, the latter is usually called a section. All lines which are straight and parallel in the building are so drawn, and not oblique, as in perspective. "The elevation of the front slightly shadowed, and showing the forms of the intended building", is the explanation in Vitruvius, B. i, c. 2. Binns, *Elementary Treatise on Orthographic Projection*, being a New Method of Teaching the Science of Mechanical and Engineering Drawing, 8vo., Lond., 1857: a second course, 1869. Jeays, *Orthogonal System of Handrailing*, etc., 8vo., 1850; 1864, second edition.

ORTHOLITH; see Maenhir. Erect stones placed in a line, in contact or apart.

ORTHOSTATA. The Greek word for an *anta* or pilaster, also called *parastata*, both terms being used in the ancient description of the Erechtheium at Athens; as stated by Inwood, p. 94.

At the temple of Apollo Epicurius at Phigaleia, Cockerell, *Temple at Phigaleia*, fol., London, 1860, p. 53, shows pl. 6, figs. 4 and 5, "the undercutting of the first course of the masonry of the walls of the cella, called "orthostatæ", relieving the beds, a practice frequent in subsequent works; this appears to be one of the earliest examples of the kind, and as such is worthy of remark. In the Theseium this feature was enriched with a beautiful moulding; the three steps of its stylobate appear to be treated in the same manner".

ORTHOSTRATUM OPUS. An upright wall cased with marble: Hierocl. ap. Stob., p. 415, 54. In the *Historia Augusta Scriptores*, cum integris notis J. Casauboni, A. Salmasii et Jani Genteri, 8vo., Lug. Bat. 1671, *vita Pescennii*, p. 658 (after quoting Greek descriptions from Codinus) occurs "'Ορθοστρωτοι, igitur *τοῖχοι*, sunt *ορθομαρμαρωτοὶ*, hoc est, crustis marmoreis et laminis inducti." Vitruvius, B. ii, ch. viii, uses the term; the passage is thus translated by Gwilt, "He who is desirous that this may not happen to his work, should build his two face walls two feet thick either of red stone, or of brick," etc. The De Laet edition, 1649, p. 28, has the note, "Orthostratæ sunt arrectaria, quacunque sint materia," etc.

ORTHOSTYLE. A columnar arrangement, the columns being placed in a straight line. 1.

ORTIZ (Cristobal). This *maestro* in 1604 directed the erection of the brick tower of S. Miguel at Montalban. 66.

ORTO (Bart. Madonna dell'); see Madonna (B).

ORTONA. A seaport of the province of Abruzzo Citeriore, in southern Italy, burnt by the Turks in 1566. Its harbour has ceased to exist. The bishopric is a very ancient one. The cathedral dedicated to S. Tommaso apostolo was restored 1675-1717 by bishop Giovanni Vespula, who also erected many edifices. There are also several churches, including that of Sta. Margherita vecchia, restored 1675-1717; convents and a Cistercian monastery. Margaret of Austria, widow of Alessandro de' Medici, and of Ottavio Farnese, died here in a magnificent palace she had built, still existing, but in

a dilapidated state. Ughelli, *Italia Sacra*, cont. by Coleti, 10 vols., fol., Venice, 1717-22. 28. 96.

ORTONA (Simone da), called S. di Luca da Ortona a mare, was also a sculptor; and 1396, was one of the artists employed on the duomo at Orvieto. 67.

ORTYGIA, see Syracuse.

ORVIETO and ORIVETO. (*Herbanum* of Pliny; *Urbs Vetus* of the Longobards and of many writers.) The capital of the delegation of the same name, in the province of Viterbo, in northern Italy, situated near the junction of the rivers Paglia and Chiana. Standing on a hill 1300 ft. high, it was in the middle ages one of the strongholds of the Guelph party. Many tombs of the Etruscan period have been explored, but none now remain open in the slopes around. Orvieto is the residence of a bishop.

The cathedral, under the invocation of the Assumption of the Virgin, is "one of the most successful specimens of Italian pointed Gothic" (Fergusson); it shows the use, inside and outside, of alternate courses of black basaltic lava and yellowish grey limestone, both found in the vicinity. The works were begun in 1288, and it is usually said that the first stone was laid 13 Nov. 1290 for a design by L. Maitani, who had just completed the front of that at Siena, but this artist was not invited until 1310 as *maestro de' maestri;* Jacobus son of Cosmas is said to have been engaged 1293. Gwilt, *Not. Archit. Ital.*, 8vo., London, 1818, p. 45, attributes the plan to N. da Pisa, and the façade to Maitani. The church is in the form of a Latin cross; the length from the choir to the great door is 278 Eng. ft., width 103 ft., and the height 115 ft. The nave presents one of the few examples in central Italy of a triforium. The roofing was completed 1321, or nearly so in the middle of the fourteenth century, but the works were in hand to 1631. Della Valle gives a list of thirty-three architects employed; comprising L. Maitani, Lando, Meo, N. and V. Maitani, Andrea di Ser Guido, Meo Nuti, Gio. di M. Agostino, Matteo di M. Ugolino, A. di Cecco, P. di Matteo, G. di Stefano, S. da Ortono, and Giacopo di Pietro Guidi: also Angelo da Siena, Sano di Matteo, M. Cristoforo, Ducimo, G. Meuzio, Cecco di Giorgio, Ant. di Federico, Stefano di Angelo, Placido di Oddone, Gio. Bernabei, L. Sfera, Franc. di Agostino, M. San Michele, Ant. da Sangallo, Mosca, B. Toti, Ipp. and Franc. Scalza, and Gab. Mercanti; most of these were of Siena: the list includes 152 carvers, 68 painters, 90 workers in mosaic, and 28 in tarsia. A general restoration of all the art works was undertaken at a great expense in 1605; and the building was consecrated 13 November, 1677. It was again restored 1850-51. The piers have statues of the twelve Apostles 9 ft. 6 in. high on pedestals 5 ft. 6 in. high above the floor of the nave, which is of red Apennine marble with inlaid fleurs-de-lis before the choir. The open roof dating 1828 is without ornament. The lower portions of the windows (after 1321) are filled up with diaphanous alabaster, and the upper part with coloured glass. The interior presents a large collection of sculpture of the 16th century, and frescoes by Luca Signorelli. The façade, which is a mask to the sides, exhibits the special use of colour in its fine mosaics in the upper portion, in place of the sculptured decoration in England and elsewhere; this with the allegorical bas-reliefs of the bases of the four pilasters of the marble façade by Giovanni da Pisa, Arnolfo and other scholars of Niccolo Pisano (described in the *Handbook*), and the coloured masonry, are the really characteristic features of the façade, which was carefully restored 1874. The *tarsia* of the choir were executed from 1331 by artists under Giovanni di Ammanati as *capomaestro* from Siena. The pulpit cir. 1579 is attributed to Scalza. The altar of the Visitation in the transept was designed by M. San Michele and executed by Moschino, son of S. Mosca, when only 15 years of age. The other altar by Mosca is praised by Vasari. The chapel of the Madonna di S. Brizio is in the south transept; in the northern one is the chapel of S. Corporale, in which is the great silver enamelled reliquary, representing the cathedral, finished 1338 by Ugolino Veri or Vieri of Siena, the metal weighing 400 lbs.: Seroux d'Agincourt, *Hist. de l'Art* (Sculpture) gives all the details; and it is described in Pennazi, *Storia dell' ostia di Bolsena*. The church of S. Domenico, used as a fortress in 1346 (probably rebuilt by M. San Michele cir. 1510), which contains the fine tomb by Arnolfo of cardinal G. di Braye, who died 1282; and the old churches of S. Bernardino, and of S. Juvenalis outside the ramparts, deserve attention.

The celebrated well, now no longer used, called il pozzo di San Patrizio, near the fortress, was designed and begun by A. di San Gallo after 1527; it is 179 ft. deep, 46 ft. diam.; excavated in the tufa, and enclosed in a circular structure with two spiral staircases *a cordoni*, for mules, of 248 steps one above the other; the buildings above ground were finished by S. Mosca in the reign of Paul III; Seroux d'Agincourt, *Hist. de l'Art* (Sculpture), fol., Lond., 1847, pl. 38. The palazzi Gualterio and Petrungeli have rich collections of pictures. The *palazzo del podestà*, until recently used as a theatre, is a specimen of domestic architecture of the 15th cent.; its rounded windows are almost Norman; Verdier and Cattois, *Arch. Civile*, etc., 4to., Paris, 1855-57, i, 59. The episcopal palace and the Jesuit college deserve notice.

Calindri, *Saggio Statistico Storico del Pontificio Stato*, 4to., Perugia, 1829. Ravicini, *Hist. del SS. corporale*, Foligno, 1696. Bottafango, *Poema sul corporale*, Rome, 1626. Horandus, *Architectura Musarum in templi Urbevetani descriptione*, Rome, 1632. *Memorie istoriche d'Orvieto e di Sta. Maria della Stella*, Rome, 1758. *Notizie istoriche dell' antica e presente Catt.*, Rome, 1781. Antamori, *Storia del duomo*, 38 pl., 4to., Rome, 1791. Della Valle, *Stampe del Duomo*, 38 pl., fol., Rome, 1791; and *Storia del Duomo*, 4to., Rome, 1791. S. Pompei, *Descrizione del duomo e del pozzo*, 2nd edit., Orvieto, 1836. Luzi, *Il duomo di Orvieto*, Florence, 1866, "an exhaustive work." Benois, Resanoff, and Krakau, *Monographie de la Cathédrale d'Orvieto*, 4to., Paris, 1876. Knight, *Eccles. Arch. of Italy*, fol., London, 1844, ii. Du Sommerard, *Les Arts du Moyen Age*, fol., Paris, 1838, Ser. i, pl. 7, gives the façade in colours. An elevation of the nave, piers and arches is given by Alfred Bailey in the Civil Engineer, etc., *Journal*, 1852, xv, 96. Gruner, *Die bas reliefs an der Vorderseite des doms zu Orvieto—Marmorbildwerke der Schule der Pisaner*, with text by E. Braun, 84 pl., Leipzig, 1858: the drawings by V. Pontani, and engraved by Ascani, Bartoccini, and Gruner. Seroux d'Agincourt, *Hist. de l'Art* (Sculpture), fol., Lond., 1847, pl. 32-3. A. J. C. Hare, in Good Words *Journal*, 8vo., Edinb., 1874, p. 191-4. Ecclesiologist *Journal*, 1868, xxix, 251-61, by C. J. H. Dennis, *Etruria*, 8vo., Lond., 1848, i, 524-30.

OSACCA; see Ohosaka in Japan.

OSBERT; was 1179 master of the works at Windsor castle in Berkshire, according to Poynter, in Wyatville, *Illustrations*, fol., London, 1841.

OSBORNE, or Osberne (John), cellarer, at Gloucester. temp. Henry VIII, made a square tower north-west of the churchyard, part of which is the gate leading to the church of S. Mary de Lode: and he repaired the Old Ram Inn, in Upper Northgate Street, over the door of which was an inscription recording the work. Fosbroke, *Gloucestershire*, fol., Lond., 1819, p. 92; 129; 130.

OSCANS, The. Before the commencement of historical record, a considerable portion of central Italy appears to have been in the possession of a people, called by the Greeks Opicans, by the Latins Oscans, who were perhaps also the Ausonians of Greek, and the Auruncans of the Roman, writers. From them was derived the name of Opicia or Opica, which appears to have been the usual appellation, in the days of Thucydides (B.C. 471-391) and Aristotle (384-322) for the

central portion of the peninsula. The Opicans were the earliest inhabitants of Campania and the borders of Latium to the Adriatic, and were still resident when the Greek colonies were planted there. This same people then occupied the mountainous region afterwards called Samnium, until they were expelled, or rather subdued, by the Sabine colonists who assumed the name of Samnites. The Volscians are regarded as of Oscan race, as well as their neighbours and allies the Aequians. An Oscan tribe probably settled in the highlands of the Apennines about Reate, which from thence descended into the plains of Latium and constituted an important element of the Latin nation. The Oscan language was closely allied with the Latin. The monuments remaining are of the comparatively late period, Sabello-Oscan; and three important inscriptions have been found—1. On the borders of Apulia and Lucania; 2, at Abella near Nola in Campania; and 3, near Agnone in northern Samnium; all in nearly the most distant quarters of the Oscan territory: condensed from SMITH, *Geog.*, s. v., Italia, p. 84b. ALBA, Cumæ, and Nola, may be among the other towns founded by the Oscans. ETRUSCAN ARCHITECTURE.

In addition to a notice of the Oscans in the article ITALIAN ARCHITECTURE (p. 56), the writer in his notes refers to GARUCCI, *Sepulchral Remains at Veii and Præneste*, in the ARCHÆOLOGIA, 4to., Lond., 1867, xli, 187-206, who notices "three different styles of art—Egyptian, Etruscan, and a third, totally dissimilar from either of the former, which may be attributed to the Pelasgi"—but the writer of the article quoted above infers that the style is "Greek—very archaic, as far as the plates show; *i.e.* like Mycenæ for beasts, lines, beads, etc." ARCHÆOLOGIA, xxxvi, pl. 27, gives the rare and archaic Oscan bronzes in the British Museum, which have a positive origin in south Italy; yet reliques (pl. 26) very clearly cognate have been found in the grave hills of Styria and Mecklenburg. *Handbook to Central Italy*, 8vo., 1861, p. 241. BIRCH, *Ancient Pottery*, 8vo., Lond., 1858, ii, passim. MOMMSEN, *Oskische Studien*, Berlin, 1845-6, and other works. GELL, *Topography of Rome*, edit. by Bunbury, 1846, p. 468. BURTON, *Etruscan Bologna*, Lond., 1876, p. 168. NOEL DES VERGERS, *L'Etrurie et les Etrusques*, Paris, 1862-4. 14. 23.

OSHMOANEIN; see HERMOPOLIS MAGNA, in Egypt.

OSIMO (Latin *Auximum*). A town in the delegation of Ancona in Italy, strongly situated on a height. The foundations of temples, theatres, and an amphitheatre are to be seen. The cathedral dedicated to Sta. Tecla and S. Leopardo was 1205 restored and enlarged. The north porch has some curious sculptures of serpents. The statues for the baptistery were cast in iron by P. P. Jacometti, and date previous to 1655. BALDI, *Vite*, Ancona, 1620; PANNELLI, *Ragguaglio della invenzione delle teste*, Pesaro, 1751. There are three parish churches: that of Sta. Palazia has a fresco by Roncalli. The *palazzo pubblico* by Bramante has a small museum of local antiquities; GALLO, *La vera interpretazione—basi*, Ancona, 1615; and MARTORELLI, *Memorie historiche della città d'Osimo*, 4to., Venice, 1705. A large episcopal palace, and the large collegio Campana 1716-19, appear to be the other important structures. 28. 50. 96.

OSIO (CARLO CESARE), from 8th March 1646, was with Giovanni Battista Guidabombarda, both engineers of the college of Milan, charged extraordinarily with the supervision of the construction of several works; and especially of the chapel of the Madonna dell' albero, and of the small doors in the façade of Milan cathedral. He published *Architettura Civile demonstrativamente proportionata ed accresciuta di nuove regole*, fol., Milan, 1661; Lyon, 1686: the four orders in which are engraved in LANGLEY, *Ancient Masonry*, fol., London, 1736. 27.

OSIRIS or ASI. The Egyptian deity RA in his attribute of judge of the deceased, the Rho-t-amenti, was one of the principal as well as the oldest of the deities of Egypt. He was represented as a man clothed in a very light robe, which descends to his feet, and in which his arms up to the hands are covered. On his head was the *atef* crown, peculiar to himself, and in his hands he held the *cucufa* staff, the *flabellum*, the *pedum* or crook, and the *crux ansata*. The head was covered with a close fitting skull cap, and the beard was long and closely plaited in the form of the letter J; this shape was characteristic of Osiris alone. The principal tombs, covering the chief members of his body, are at This or Abydos, and on the island of Philæ. He was also regarded as the god of agriculture. His worship continued without interruption till the Roman conquest, when that of Osiris-Apis, or the god Serapis was introduced. He had a variety of names, many of them mystical; COOPER, *Archaic Dict.*, 8vo., Lond., 1876. WILKINSON, *Modern Egypt and Thebes*, 8vo., Lond., 1843, ii, 112. PIERRET, *Dict. d'Arch. Egypt.*, 12mo., Paris, 1875, p. 394. PLUTARCH, *De Iside et Osiride*. MARIETTE BEY, *Abydos, Temple de Seti*, fol., Paris, 1869. A statue of this deity in wood, supposed to be nearly 6000 years old, was found by Mariette Bey in the Serapeum, at Sakkara; it is now in the Egyptian museum at Boulak, the harbour of Cairo; MARIETTE, *Catalogue*. DALY, *Revue Générale*, 4to., Paris, 1860, xviii, 11 and 14.

A figure of this deity stands attached to each of the supporting pillars, but not sustaining the entablature, in front of the Ramesium at Thebes, in Egypt. Other statues of this deity appear at Aboo-Simbel, each being 17 ft. 8 ins. high without cap and pedestal. This statue thus placed is often called an "Osiride", and sometimes, but erroneously "caryatide".

OSMA (Anc. *Argælæ Uxama* or *Oxomen*). A city in the province of Soria in Spain, situated on the river Ucera. The bishopric was founded in the fifth century. The cathedral under the invocation of the Assumption of the Virgin was begun 1232, and is considered a "magnificent structure". The chief *retablo* and the *trascoro* 1556 are by Juan di Juni. The chapel for Palafox is by F. Sabatini. The tower, façade, and sacristy, dating *cir.* 1750, are the work of J. de Sagarvinaga. The university, founded 1550; a college, several convents, etc.; and the great hospital of S. Augustin designed and directed 1699 by I. Moncalcan and P. Portela, are among the other chief buildings. Gil GONZALEZ DE AVILA, *Teatro ecclesiastico de las iglesia*, fol., Madrid, 1645-1700, p. 39. 96.

OSMUND, bishop of Sarum, 1078-99, completed the cathedral which had been commenced by his predecessor Herman. BRITTON, p. 7; DODSWORTH, p. 17. 19.

OSNABRÜCK (Engl. OSNABURG). A town in Hannover, situated on the rivers Haase and Nèthe. It is entered by five gates, and has a castle and barracks. A statue of Justus Möser, "the Franklin of Westphalia," (died 1799) is placed in front of the cathedral. It is the see of a bishopric founded about 776, 783 by Charlemagne, or 888, secularised 1803 and incorporated with Hannover. The Roman Catholic bishopric dates from 1858; the cathedral of S. Peter (transition of the twelfth century) is a small cruciform church with a square east-end, with three different towers of which the northern is the most ancient, and the one over the choir is octagonal. The west entrance was renewed 1840; the transepts are separated by a wall breast-high from the church: the sacristy and cloisters date 1150-1200. The bronze font is by Gerard and of the 12th century. The church of S. John (transitional but later than the cathedral), is also a Latin cross on plan, with a square east end, the transepts separated by a screen wall: the sacristy, of a later date, has fine sedilia and rose window. This edifice is illustrated by KING, *Study Book*, fol., London, 1858-68, iii, in twelve plates and showing the iron-work, crosses, etc.

The Lutheran church of S. Catherine, and that of S. Mary (early in the fifteenth century), apparently copied from the

cathedral, has a choir with a square east end; the pillars are very high and slender; there is a richly carved wooden reredos, and a rich Gothic tabernacle: the old altar is at the end of the north aile. The king's palace was erected 1665; its buildings are shown in drawings made 1763 by S. A. Vick or Viosk, in the King's Collection, Brit. Mus. The *langhaus* is of the fourteenth century; the *rathhaus*, a castellated structure of the end of the fifteenth century; the new town hall; the Lutheran and R. C. gymnasiums and orphan houses: the theatre; infirmary, and several hospitals, deserve notice. Möser, *Osnabr. Geschichte*, 8vo., Berl., 1819-24. Zedler, *Univ. Lexicon*, fol., Leipzig, 1732-54. Friderici und Stüve, *Geschichte du Stadt O.*, Osn., 1816-26. 14. 28. 50. 96.

OSNAGO (Paolo da), was engaged from 1 May 1392 to 16 April 1411 on the cathedral at Milan. Giulini, *Memorie*, 4to., Milan, 1760-71, xi, 450. 27.

OSPEL (.....), designed 1617 the Leopold Church at Vienna. 14.

OSSOLARIO (Tiberio), of Cremona, see Ognibene (a).

OSSUARIUM. A word which has been found inscribed upon an urn, published in Montfaucon, *Antiquité expliquée*, fol., Paris, 1719-24, v, pt. 1, which according to Fabretti, had been used to enclose the ashes and the remains of the bones of a human body after it had been consumed upon the funeral pile. It has also been explained as the marble sarcophagus within which was placed the urn. 6.

OSSUARY (Fr. *Ossuaire*). A place for the deposit of bones, hence in England called bone-house and charnel-house; in addition to what has been stated therein, the example at Ripon minster is perhaps the most remarkable in this country. Accounts of several are given in the Gentleman's Magazine, new series, 1859, vii, 156; 499. A crypt supposed to date cir. 1100 was discovered 1859 under the north transept of the church at Christchurch in Hampshire, 30 ft. by 12 ft., and 9 ft. 7 in. high, in which were about 1500 human bones laid with great regularity and care. The crypt of the Lady chapel at Hereford was designed to be a carnary, and there were charnel houses at Worcester, and at Norwich (now the Free School). Under the chancel of Hythe church, Kent, there still remains a large collection of bones. Madley church, Herefordshire; Lynn Regis, Norfolk; and S. Peter's in the East, Oxford, present other examples.

In Switzerland, *ossuaries* are found in the canton of Appenzel; and at Steinen is one attributed to the date 1111; at Morat is one called "l'ossuaire des Bourguignons"; and one exists at S. Michael's church near Zug. These bone-houses were the receptacles of skulls and bones, which, after a certain period, were disinterred to make room for other remains. An oratory or small sepulchral chapel called S. Bernardino del Monte, at Milan, is entirely walled with skulls and bones symmetrically arranged. The *casa dos osos*, "golgotha", or bone-house, at the Franciscan monastery at Evora in Portugal, has the walls and eight piers, carrying a vault 66 ft. long by 36 ft. wide, lined with skulls; Murphy, *Travels*, 4to., London, 1795, p. 303, pl. The ossuary at the church of S. Lorenzo at Chiavenna, has the skulls and arm-bones curiously arranged, with labels to mark the names of the former owners (Street, *Brick, etc., Arch.*). One at Voghera is given in Leclère, *Recueil*, fol., Paris, 1826, pl. 23. A notice of the Parsee bone-house, *Dokhmeh*, is given s. v. Charnel house, it is also described in Chardin, *Travels*, viii, 96; 378. Similar structures to these last are scattered about the hills surrounding lake Titicaca in South Peru.

Besides the examples in France, given s. v. Bonchouse; the church at S. Thegonec, a few miles east of Lanmuir in Brittany, has an ossuary dated 1677: another 1648 at Guimillieu, about three miles distant; and others; Brewer, in *Sessional Papers*, Royal Inst. of Brit. Archts., 1872-3, p. 172-3. A fine one of the thirteenth century under the large tower of the church of S. Michel at Bordeaux, is given in Gourneau, *Guyenne hist. et mont.*, fol., Bord., 1842, i, 21. Reliquaries of churches are a sort of ossuary.

Virloys, *Dict.* s. v. *charnier*, describes the real bone-house as a portico-gallery (formerly put round the graveyards of parish churches) where the catechism was taught, and the bones were placed in the roof.

OSSORY. Formerly a Protestant and also a Roman Catholic diocese, co. Kilkenny and King's and Queen's co., in Ireland. The Protestant see comprises Ferns, united 1600 to Leighlin, and these cir. 1840 to Ossory, and since 1833 the seat has been transferred to Kilkenny city.

OSTERWALD STONE. A fine grit stone obtained from near Hildesheim, and used in S. Nicholas church at Hamburg, under Sir G. G. Scott, 1845-63.

OSTIA. A former seaport of Rome, distant from it fourteen miles, and situated on the left side of the south arm of the river Tiber on its former course now silted up; and eastward of Ostium. It was founded 830 by pope Gregory IV; in the tenth century it became the port of Rome from the silting up of Trajan's harbour, was overthrown 1155, and occupied 1408-13 by Ladislaus king of Naples: it is now a poor place. Of the castle built by pope Sixtus IV (1471-84) a few lofty but ruinous brick towers only remain. The bishop della Rovere (afterwards pope Julius II, 1503-13) being castellan of Ostia employed G. Giamberti called San Gallo for two years in improving the fortress. The small cathedral, dedicated to Sta. Aurea, virgin and martyr, is cir. 1475 by B. Pintelli. The episcopal palace is now a museum of antiquities. The gallery and chapel in the palazzo Sacchetti called il Pignetto, beyond the porta Angelica, cir. 1630, are by P. Berretini; Falda, *Il Nuovo Teatro*, fol., Rome, 1669, iv, 44 and 50. Gell, *Topography of Rome, etc.*, 1846 edit., p. 336-8; and Porto, 361-4. Valéry, *Voyages, etc., en Italie*, 2nd edit., 8vo., Paris, 1838; transl. by Clifton, 8vo., Paris, 1842. Labat, *Voyage en Espagne et en Italie*, 8 vols., 8vo., Paris, 1730. Eschinardi, *Descr. di Roma, etc.*, 8vo., Rome, 1750, with Cingolani's map, temp. Benedict xiv (1740-58). The bishopric dates from 477. 14. 50. 96.

At Castel Fusano, about two miles from Ostia, is a fortified house with low towers at the angles pierced with loopholes, the staircase is little more than a ladder; it was erected by Sacchetti in the seventeenth cent. 28.

OSTIUM. The ancient seaport of Rome, situated fifteen miles from that city on the left bank of the south branch of the river Tiber, and now about two miles from the sea. Strabo says it was founded 634 B.C. by Ancus Martius, king of Rome; it was ruined by the Saracens in the fifth century; in the time of Procopius in the middle of the sixth century it had lost its walls and was nearly deserted. The site, about a mile and a half in length and a mile in breadth, is now marked by heaps of ruined buildings, including a Mithræum, which has been explained by Visconti. Among the earliest explorers were Gavin Hamilton and — Fagan; then 1803-6 pope Pius VII; 1824 cardinal Pacca and Signor Cartoni; in 1854 pope Pius IX under P. E. Visconti; and the Italian government having bought the land in 1871 further excavations have been made under signor Rosa. A general account with a plan is given in *Handbook of Rome* (Murray), 1875, p. 478-82. Guattani, in *Monumenti Antichi*, 4to., Rome, 1805. Building News *Journal*, 1858, iv, 28: Builder *Journal*, 1865, xxiii, 367, and xxv, 347, describe some of the discoveries.

The formation of another port, now called Porto, was attempted by Julius Cæsar at two miles distance on the northern point of the river, now above three miles from the mouth of it; and a harbour for the protection of the fleets bringing corn from Africa and Asia for the supply of the city, with store-houses, etc., was formed by Claudius (41-54), "one of the boldest and most stupendous works of Roman magnificence" (Gibbon); it was finished by Nero (54-68): Trajan (98-117), formed an inner basin or dock, with quays, and extensive

ranges of magazines and storehouses, hence called portus Trajanus; its circuit nearly entire is 7200 ft., the depth of water is now scarcely 10 ft.; it was completed about A.D. 103. The town which grew up inland received the name of *portus Ostium*, and was adorned by Hadrian, Septimius Severus, Aurelian, and Tacitus. Trajan also formed a canal from the river to the sea-beach: and likewise a new port at Centum Cellæ now CIVITA VECCHIA. Porto was seized by Alaric 409, injured by Belisarius 537, was in ruins 827, and was further desolated by the Saracens. Some remains of the town walls and of the aqueduct still exist. In 1612 Trajan's canal was cleaned out by order of pope Paul V and continued to the sea-coast; a small port called Fiumicino was constructed, which is still used. Fea, Canina and Lanciani conducted the excavations made 1864-70 for prince Torlonia. A good general plan is given in the *Handbook of Rome* (Murray), 1875, p. 473-4. The bishop's palace was the former mediæval castle of Porto; the cathedral of Sta. Rufina is modernized, but has a bell tower of the 9th or 10th cent. Opposite to Porto is S. Hippolito with a good mediæval bell tower; scarcely anything remains of the church dedicated to one of the first bishops of the see. 14. 23. 28. 96.

LABACCO, *Libro d'Architettura*, fol., Rome, 1558, describes some storehouses facing the canal. CASTIGLIONE, *Numismatum Ostiensis*, etc., Rome, 1614. SERLIO, *Architettura*, fol., Venice, 1663, p. 155, gives a plan of the buildings around the inner harbour. TIGRINO DE MARSIS, *Utriusque Portus Ostiæ descriptio*. LUCATELLI, *Dissert. sopra il porto di Osta e sua medaglia*, Roma, 1750. MEYER, *Navigazione del Tevere*, fol., Roma, 1683; 1685; 1686. FEA, *Ristabilimento della città: Antichi porti d'Ostia, ora di Fiumicino*, 8vo., Roma, 1824: *La Fossa Trajana*, etc., 8vo., Rome, 1824: *Basilica Ostiense di S. Paolo riuniti nel* 1823 *dopo l'incendio*, 8vo., Rome, 1825: *Storia delle saline d'Ostia*, 8vo., Rome, 1831: *La basilica Ostiense, etc.*, 8vo., Rome, 1833: and *Relazione di un viaggio ad Ostia*, 8vo., Rome, 1802; and by NIBBY, *Analise—degl' intorni di Roma*, 8vo., and 4to., Rome, 1837, ii, 426-474; 602-660. P. CAMPANA, *Scavi d'Ostia*, 1834. PRELLER, in the *Berichte der Sächsischen Gesellschaft* for 1849, p. 5-38. PIÙ, *Il Tevere navigabile, etc*, Roma, 1835; and *Storia delle saline*, Roma, 1831. D'ANVILLE, in *Mémoires* de l'Academie des Inscriptions, xxx, 198, gives a plan. BERGIER, *Grands Chemins des Romains*, ii, 356. GIBBON, *Decline*, 8vo., Lond., 1854, iii, 433. CANINA, *Sulla stazione delle nave d'Ostia*, etc., Roma, 1838. DALY, *Revue Générale*, 4to., Paris, 1856, xiv, 99; xv, 262-7; 303-32, pl. 31-2.

RENNIE, *Ancient Harbour, etc.*, read at the Inst. of Civil Engineers, 27 May 1845, given in *Proceedings*, iv, 307, with seven plates, and a plan of the locality made by capt. W. H. Smyth, R.N.; also printed with a plan in CIVIL ENGINEER, ETC. *Journal*, 1847, x, 20, and a plan of the Roman harbours. CRESY, *Encyc.*, 1847, gives a restored section through the port and an elevation of the pharos; reprinted in same *Journal*, x, 103-4.

OSTIUM. This Latin term is the only one, except *aditus* and *agressus*, that appears to answer to the English "doorway," although it is sometimes translated either as the dressing, which it could never have meant, or as an inner door; but it must be admitted that in late times *ostium* was synonymous with *janua*, according to JULIAN, 6, i, 59, "in aliena ædificia fenestras et ostia imposuit," if not according to ULPIAN, 43, xxiii, 11, "ostium sepulcri evellat aut effringat," and perhaps with *fores*. Unless PETRONIUS, *Satyr.*, xcvi, confused the technical terms, he shows that *valva* was a leaf and *ostium* a door, as in "Videbamus omnia per foramen valvæ quod paulo ante ansa ostii disrupta laxaverat." VITRUVIUS, iv, 6, is headed "De Ostiorum et antepagmentorum sacrarum ædium rationibus."

As the doorway in the interior of a house, it is mentioned in ISID., *Orig.*, xv, 7; and VIRGIL, *Æn.*, vi, 43, 81, but it must have meant more than the door of a chamber, for to knock at the door is "pulvare ostium." From VARRO 1, 51, i, it would appear to mean an opening only, as he says of the cracks in the earth of a threshing floor, "they afford *ostia* to the mice and the rats". FESTUS, *Verb. Sig.*, fol., Leipsic, 1839, lib. xiv, p. 220, has "Posticum ostium dicitur in posteriore parte ædium:" and PLINY, xxxiv, 7, "Camillo inter crimina objecit Sp. Carvilius quæstor, quod ærata ostia haberet in domo."

It is also stated to be the name of the hall to which the door gave admittance. 78.

OSTRICH BOARDE; see ESTREGE BOARD. EASTLAND BOARD.

OSTRUM. A red or purple liquid colour used by the ancients, to which the proper consistence was given by adding honey. It was produced by the juice of a fish called *murex*, and differed in tint according to the country from which it came; being deeper and more violet when brought from the northern, redder when from the southern, coasts of the Mediterranean: VITRUVIUS, vii, 13. A pot containing a rose-coloured substance found in the baths of Titus, was experimented upon by Sir H. Davy, who seemed to consider it a specimen of the best Tyrian purple; *Phil. Trans.*, 1815. Sandaracha, when roasted with red lead, produced *sandyx* of a dull hue, which when mixed with *sinopis* was called *syricum;* this was chiefly used as a ground colour;—when *ostrum* was laid on with it, it made a purple: *Histoire de la Peinture Ancienne, extraite de Pline* (par D. Durand), fol., Lond., 1725. SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Pompeii*, 8vo., Lond., 1832, ii, 55, 57. PLINY, *Hist. Nat.*, ix, 61.

OSTRYA VIRGINICA, Ironwood. A native of the United States, Lower Canada, Pennsylvania, and the Southern States of North America. It weighs 48 lbs. 11 oz. per cubic foot. It is also called Carpinus ostrya, Hop hornbeam or ironwood. In New Hampshire and Maine it is called Lever wood, and in Illinois *bois dur* or hard wood. It is white, compact, fine grained, and heavy; and rarely exceeds 35 or 40 ft. in height and 12 or 15 ins. in diam. The tree flourishes also in France, where it is used for levers. MICHAUX, *North Amer. Sylva*, iii, 51. 14. 71.

OSTUNI (Anc. *Hostunum* or *Ostunum*). A city of the province of Terra di Otranto, near Brindisi, in Southern Italy. The see dates from the sixth century, and re-established *cir.* 1000. The cathedral under the invocation of the Assumption of the Virgin, is considered a "well preserved and beautiful edifice"; there are three parish churches, several convents, monasteries, an hospital, an episcopal palace, etc. UGHELLI, *Italia sacra*, fol., Venice, 1717-22, ix, 46. 28. 96.

OSUAN, ASSOUAN; see SYENE, in Egypt.

OSYMANDYAS. Seti or Sethos I, son of Rameses I, also called Maneptah (the beloved of Ptah), is supposed to be the famous Osymandyas commemorated by the Greek writers: his son was Rameses II or Sesostris. Among the numerous works erected by Seti are the hall at Karnak, the temple erected in memory of his father, and his own splendid tomb in the Valley of the Kings. The description of the tomb of Osymandyas by Hecatæus, given in DIODORUS SICULUS, lib. i, p. 44, etc., is supposed to comprise the details of the Ramesium or Memnonium at Thebes, with the sculptures at Medeenet Haboo; WILKINSON, *Handbook;* WILKINSON, *Top. of Thebes*, 8vo., Lond., 1835, p. 12-6. JACKSON, *Chron. Antiq.*, 4to., Lond., 1752, ii, 396.

OSYRIS NAPALENSIS. A wood of Nepal, East Indies, is called *Shoori* in Newar and in Porbuttea. O. PELTATA, of Hindostan, is called *Phaoun* in Tavoy, and weighs 41 lbs. per cubic foot. Both are used for building purposes. 71.

OTMARSHEIM, and OTHMARSHEIM, see OTTMARSHEIM.

OTOLUM. A city in Guatemala, Central America, discovered 1787 by capt. del Rio, an account of which was pub-

lished in English in 1822; the ruins are now known as those of PALENQUE, although that place is fifteen miles distant. NORMAN, *Yucatan*, 8vo., New York, 1843, p. 284-92; 295.

OTRANTO (anc. *Hydruntum*). A seaport of Calabria in Southern Italy. It contains a castle built by Alfonso of Aragon (1104-34) with two large circular towers added by Charles V (1519-55); a view of the walls is given in WILLIAMS, *Travels*, 8vo., Edinb., 1820, ii, 145; and another in KEPPEL CRAVEN, *Tour through the Southern Provinces of Naples*, 4to., Lond., 1821, p. 142. S. NON, *Voyage Pitt. de Naples*, fol., Naples, 1781-6, iii, 60, has a view of the town, which is now in a dilapidated state since its capture after landing by the Turks 28 July 1480-81. Its harbour is still large and commodious; at a little distance are the ruins of the *torre del Serpe*, erected by the Venetians as a lighthouse for the port.

The cathedral dedicated to the nativity of the Virgin was built by order of king Ruggiero I, and dedicated 1088. It contains several green marble columns taken from a temple to Minerva, on the site of which is erected the now ruined church of S. Nicolas, and has a rude mosaic pavement representing a variety of animals and dating 1163-5. A plan and view of the crypt, in which are columns of giallo antico and pavonazzo marble, are given in FERGUSSON, *History of Arch.*, 8vo., Lond., 1867, ii, 253, taken from SCHULZ and QUAST, *Kunst des Mittelalters in Unter-Italien*, 4to. and fol., Dresden, 1860; and a view is in CUCINIELLO and BIANCHI, *Viaggio pittorico*, fol., Naples, n. d., ii, 109. There is also a parish church, and the archbishop's palace. 14. 23. 28. 50. 96.

OTRICOLI (Anc. *Ocriculum* and *Otriculum*). A former considerable town of Umbria, (and the first to form an alliance with Rome 308 B.C.), situated on the Via Flaminia, near the river Tiber, in the vicinity of Spoleto, in Central Italy. In some ancient inscriptions it is recorded as "splendidissima civitas Ocricolana." Excavations commenced by pope Pius VI, 1775-81, brought to light an arched *atrium* leading to an octagon hall 53 palms diam. in which was the celebrated pavement of *opus vermiculatum*, and the colossal head of Jupiter, both now in the Vatican museum; QUATREMÈRE DE QUINCY, *Dict. d'Arch.*, s.v.; also an amphitheatre 312 ft. by 230 ft. in two stories, "possibly the most modern of its class"; FERGUSSON, *History*, 8vo., Lond., 1867, i, 306; *thermæ* of brick; other buildings of which the purpose could not be determined (CENTO CAMERELLE); and one called a basilica, described by GUATTANI, *Mons. Antiche Ined.*, 4to., Rome, 1784; and in the Roman *Notizie sulle Antichità e Belle Arti*; it is remarkable for the fluted Corinthian columns, hemicycle, decorations, and general arrangement of its plan,



"but its object as well as age is very uncertain"; FERGUSSON. The collegiate church of Sta. Maria in the present town has a very old crypt. 23. 25. 50. 96.

OTTAWA (so called 1854), founded 1827 and then called By-town, situated in the province of Ontario, is the capital of Carleton county, became a city 1854, and since 1858 the capital of the dominion of Canada, in British North America. It is built on the river Ottawa: at the west end of the town are the celebrated Chaudière falls, 40 ft. high, below which is the Union (suspension) bridge connecting Upper and Lower Canada; at the north-east end are two other falls each 40 ft. high, over which the river Rideau falls to join the Ottawa. The Rideau canal divides the city into the upper and the lower towns, has several locks, and a stone and an iron bridge. This water power affords the principal trade of LUMBER, *i.e.* timber in logs and squared. The streets are straight, broad, and regular, and the buildings of stone handsome and uniform. There are seventeen churches, a Roman Catholic cathedral with lofty spires, several hospitals, asylums, schools, and hotels. A house about two miles distant, by Stent and Laver, is described in BUILDER *Journal*, 1859, xvii, 114.

For the Parliament Buildings a competition was opened; the first premium of 1000 dollars was awarded to Fuller and Jones of Toronto, and the second of 400 dollars to Stent and Laver of Ottawa, out of sixteen competitors. For the departmental buildings, Stent and Laver 1000, and Mr. Fuller 400. For the Governor's residence, Mr. Cumberland 400, Fuller and Green 200 dollars. The designs for the second portion by Stent and Laver were subsequently made to harmonise with those by Fuller and Jones, which are in the Italian Gothic style, and were to cost £75,000; it is given in BUILDER *Journal*, 1859, xvii, 808, with a plan of the vaulting of the library, 90 ft. diam., taken from that of the stone groin in the kitchen of the monastery at Durham. The south front is 472 ft. long, and returns 572 ft., and is 40 ft. high, the central tower being 180 ft. The east block of the departmental building is 318 ft. by 253 ft., and the west 211 ft. by 277 ft. A general plan is given in *B. J.*, xviii, 184; and 627, 767; also xxi, 169. The first stone was laid 1 Sept. 1860 by H.R.H. the prince of Wales. A good view of the buildings, which cost 4,000,000 dollars, is given in ILLUSTRATED TIMES *Journal*, 1863, ii, 377-8; a view of the front in DANA and RIPLEY, *American Cyclopædia*, 8vo., New York, 1875, s. v.: also BUILDING NEWS *Journal*, 1859, v, 1062.

OTTEN (JACOB HUSLY), an eminent architect of Amsterdam, where he designed the institution Felix Meritis. He died in middle age in 1795.

OTTMARSHEIM, in Alsace. The church, both in design and dimensions, is a direct copy of that at Aix-la-Chapelle built 796-814, and rebuilt 983-1002; the only difference in plan is that it is an octagon externally as well as internally; and that the gallery arches, instead of being filled with a screen of classical pillars borrowed from Italy, are ornamented with shafts supporting eight arches designed for the place. It is 92 ft. in circumference and about 40 ft. high inside. There is no tradition as to who built this church, or for what purpose it was erected. It is older than that at Nimeguen, but is certainly a copy of Charlemagne's church, and apparently not much more modern; FERGUSSON, *Hist. of Arch.*, 8vo., London, 1865, i, 597. HUGO, *Hist. Gen. de France*, 4to., Paris, 1836-7, ii, 439, pl. 86. GOLBERRY, *Antiq. de l'Alsace*, fol., Mulhouse, 1828, p. 121, pl. 40. VIOLLET-LE-DUC, *Dict.* DALY, *Revue Générale*, 1849, viii, 114, notices that this church, with those at Ste. Croix at Quimperlé, Rieux Mérinville, Vénasque, S. Germigny (Loiret) dedicated 806, S. Michel near Angoulême, etc., have different arrangements, but a conformity of the square plan sufficing to form a class to distinguish them from other constructions of the same period. GERMAN ARCHITECTURE.

OTTMER (KARL THEODOR), born 19 January 1800 at Brunswick, was the son of a physician. While completing his studies at Berlin, he competed for, and was employed to erect July 1823-24 Aug. the *königstadter theater*, the designs having been corrected by Schinkel: and 1826-7 the *Sing academie* in the same city, resembling an apteral Greek temple, 140 ft. by 60 ft. He was also engaged to superintend the alteration of the interior of the theatre at Leipzic. He then 1827-29 studied at Paris and visited Italy, where he worked upon the designs for a palace to exceed all others in extent and magnificence. He was recalled to Germany to design a new theatre for Dresden, but one was erected by Semper. While there he designed and erected a theatre and a casino for the duke of Saxe Meiningen. Returning in 1830 to Brunswick, he published part 1 of *Architektonische Mittheilungen*, fol., Brunswick, 1830, containing his Berlin theatre: and was appointed *hofbaumeister*. The palace at Brunswick having been burnt Sept. 1830, duke Wilhelm ordered a design, which was commenced 1831 and completed for habitation in 1837. The principal mass was 400 ft. long by upwards of 200 ft. in depth and 80 ft. high, but loftier in the centre; the open colonnades intended to form a *place* in front were not carried out. The principal entablature—over 2000 ft. in length—was of cast iron, and much

novel construction was displayed throughout. The palace included a Grecian Doric hall 150 ft. in length; a grand staircase; an upper vestibule forming a rotunda 70 ft. diam., and 60 ft. high: a gallery, theatre, concert room, banqueting room, etc. The whole building with the exception of the left wing was burnt 23 Feb. 1865.

He also designed at Brunswick the *theater-Intendantur*; the infantry barracks (Florentine style) having a façade of 350 ft.; the iron bridge; the villa Bülow; New Richmond; the *Schmidtsche-haus*; the *Interim* railway station; with other structures public and private. An engraving of the schloss Wilhelmsburg at Brunswick, erected for W. von Marenholtz, *freiherr*, was published at Paris in 1837 from Ottmer's drawings; the style is highly enriched Roman; the centre forms a quadrangle joined by arcades to the wings: Loudon, *Arch. Mag.*, 8vo., Lond., 1837, iv, 204. He also made a design for cavalry barracks in the same style as those for infantry; published in Romberg, *Zeitschrift für praktische Baukunst*, 4to., Berlin, for 1842; and published *Das im Goth. style neu erbaute theater im Herz. Schlosse zu Wolfenbüttal*, etc., fol., Brunswick, 1838, comprising designs for Gothic country houses. His death 22 August 1843, aged 43, was caused by harass of business acting on a delicate constitution. Foreign Quarterly Review, *Present School of Architecture in Germany*, xxvii, 1834. Civil Engineer, etc., *Journal*, 1838, i, 368. 14. 68.

OTTO, of Lorsch, "a well-known architect," cir. 1090; Freher, *Germ. Rerum Script.*, fol., Franc., 1600-11, i, 82.

OTUMBA. A town in ruins situated near lake Tezcuco in Mexico. Its chief interest is derived from its antiquities. 50.

OUBLIETTE, from the Fr. *oublier*, to forget; this term was generally used in the plural, *les oubliettes*. A place of confinement in ancient castles, bastilles, and donjons, for the ultimate disposal of prisoners by starvation or by falling from a great height. Under the gateway of the main entrance of the prison of the conciergerie at Paris, forty-five feet below the surface, were the famous *oubliettes*, narrow, fetid, filthy, cells, into which the victims were hurled and forgotten, until the place was required for a fresh victim. An arched passage, closed by an iron gate, may be still seen in the quay wall, just above the level of the river Seine, down which the bodies could be dragged and cast into the stream. About 1810 these *oubliettes* were removed by M. Peyre, architect to the palais de justice. The *oubliettes* at the castle of Clisson near Nantes are chasms between the walls, and of great depth, all the lower part, perhaps 60 ft., worked down through the rock; *La Vendée and Brittany*, 12mo., 1855. Those at the castle of Chinon, a deep well; at the Bastille, funnel shaped; and at the château de Pierrefonds, a deep well; are given in Viollet-le-Duc, *Dict. Rais.*, vi, 451; others are said to exist at the château de Blois, but he has not been able to identify them: Monumens Historiques de France, *Archives*, Blois, p. 16, note. The two first are also given in Daly, *Revue Générale*, 1843, iv, 443. In the prison tower at Nuremburg is a lower range of dungeons used so late as the 17th cent., over the door of each is a symbol, as a horse, a dog, a stork, etc. Near to Volvic are the ruins of the castle of Tournoëlle, once one of the strongest fortresses in Auvergne; the *oubliettes* entered by a small hole from above, still exist under the round tower.

In the ducal palace at Venice, a prisoner being condemned in the judgment hall and sentenced, "*vade in pace*", was escorted over the Bridge of Sighs to a cell, thence at the time of tidal low water to the *oubliette*, where he was decapitated, his body sewn in a sack, passed through a hole in the exterior wall to a gondola, floated to the Adriatic and dropped into the ebbing tide; the flowing tide entering the *oubliette* through perforations in the stone floor, diluted and washed away the blood stains, so all was forgotten. In the castle of Chillon the *oubliette* is in a turret corbelled out over the Lake of Geneva, and approached by a doorway from the torture chamber; it is simply a descending spiral staircase of three steps; a pinioned prisoner descending this staircase in the dark, found no fourth step and was precipitated into the lake. In the papal palace at Avignon, Rienzi was a prisoner in the tower called "*des oubliettes*". In inland prisons, where water could not be used as the vehicle for removing every trace of an heretical, criminal, or political prisoner, the *oubliette* was commonly made with a hinged wooden floor over a deep pit; by suddenly drawing a bolt the prisoner was precipitated to the bottom, stunned or killed by the fall, and quicklime being thrown upon him, all was forgotten. In the modern *oubliette* at Newgate, the publicity of a coroner's inquest intervenes between the drop and quicklime.

The term *oubliette* was also used for the vault of a *latrine* or privy. R. R. R.

Merimée, in *Instructions du* Comité des Arts et Monuments, *Arch. Militaire*, Paris, 1843, p. 75, 82, referring to a *Tribunal Véhémique ou secret*, in Germany: Skene, *Some account of the Subterraneous structure in Swabia, etc., under Baden castle*, printed in Society of Antiquaries of Scotland, *Transactions*, 4to., Edinb., 1831, iii, 17. Marchangy, *La France au XIV siècle, cir.* 1835, p. 416, gives an animated description of this terrible institution. 7. 28.

OUDE (Nat. *Ayodhya* and *Ayodia*). The capital, until removed to Lucknow, of the province of the same name, in Hindustan. It is situated on both sides of the river Goggra, over which is an iron bridge lately erected with materials from England. The town was formerly greatly venerated by the Hindoos; but its temples are in ruins, except a mosque built by Aurungzebe (1658-1707) but properly by Baber (1494-1530), and some Mahometan tombs. Tod, *Rajasthan*, 4to., Lond., 1839. Fergusson, *Indian Architecture*, 8vo., Lond., 1876, p. 602-5. Buchanan, *Mysore*, 4to., Lond., 1807. Thornton, *Gazetteer*, 8vo., Lond., 1858. The town of Fyzabad has been erected close to Oude. 50.

OUDENAARDEN, commonly Oudenaerde and Audenaerde (Fr. *Audenarde*). A town of East Flanders, situated on the river Schelde; it is of great antiquity; a castle was built 411 by the barbarians. The fortress was destroyed in 1730 and the walls dismantled 1745. In the fourteenth and fifteenth centuries this place was renowned for its tapestries. The tower called *het Saechsen*, and the bridge of the porte d'Eyne, are very ancient structures. A statue of a female figure by Geefs commemorates 1865 the Belgian volunteers who died in Mexico. The stone fountain in the *grande place* with bronze dolphins cast by J. Sacken of Lille was erected 1676 by Louis XIV, but it has been altered.

The church of S. Walburge, founded 845, burnt 880, and 1127, was rebuilt 1150-9, of which date are the ailes of the choir, but the traceried windows are cir. 1400: the choir was rebuilt cir. 1390: the transepts, nave, and ailes, date 1414-1515; the tower 1478-1515 is 230 ft. in height; the spire 78 ft. high was burnt 1803 by lightning. There are three other churches: that of N. D. de Pamele, founded 1110, was rebuilt and made a parish church 1235-39: it is in the form of a Latin cross with a central tower and spire, and is the finest example of the Transition style in Belgium. An inscription in the apse records the name of "Magister Arnulpho de Bincho", the oldest known architect in Belgium. The chapel of N. D. de Kersselaereberg was built 1570.

The small town hall (Flamboyant) was designed by H. van Pé or Pede and W. de Ronde, Apr. 1525-35; or 1527-30 (Van der Meersch, in *Messager* des Sciences et des Arts, 1829, livr. 3, p. 65, etc.; and 1841, p. 239: *Moyen Age Monumental*, pl. 45); it cost 77,993 francs. The Florentine arabesques of the council chamber were designed and executed by P. van der Schelden for 360 fr., exclusive of the oak from the forest of Valenciennes; casts of twenty panels of figures and foliage are in the architectural school of the Royal Academy of arts in London. The staircase is probably by R. Keldermans,

1528. The hospital of Nôtre Dame was removed to its present site in 1332; its archives commence 1317. Two orphan houses, many schools, a college, a large gratuitous school opened 1833; the ancient *halle aux toiles*, since 1819 a theatre; and the academy 1779, the basement of which is a meat market, are the other chief buildings. Weale, *Handbook to Belgium, etc.*, 8vo., Lond., 1859. Wauters, *Belgique*, 8vo., Brux., 1846, p. 188. Stappaerts, *Belg. Mont.*, 8vo., Brux., 1844, i, 106. Stephens, *Flemish Relics*, phots., 4to, Lond., 1866. 14. 28.

On the north of the town, an old fortress built 1385, which until 1557 was a palace of the dukes of Burgundy, was almost entirely rebuilt 1617 as the governor's house, and is now a military hospital. The château at Wanneghem near the town, was designed 1786 by Guimard; it is engraved in Goetghebuer, *Choix de Mons.*, 1827, pl. 27-9.

OUDENAARDEN (Giles de); see Audenarde (G. de).

OUDET (Joseph Theodore) of Bar-le-Duc (Meuse), born 1793 at Paris, became a pupil of Couvers. In 1816 he was nominated inspector of buildings of the dépôt de mendicité at Villers-Cotterets; 1823 architect-engineer to the duke of Orleans on his property in the Valais; 1825 Jan. chief architect to the department de la Meuse: secrétaire-rapporteur de la commission des bâtimens civils du département de la Meuse; and conservateur du musée at Bar-le-Duc. Between 1825-30 he had erected sixteen edifices for the government; including the great seminary at Verdun; a military hospital at S. Mihiel; a parish church at Stenay; eight other churches; three *portails*; a prison chapel; seven presbyteries; two cemeteries; two *colonnes crucifères*; four *mairies*; a *pressoir communal*; six fountains; eight public washing places; two *abreuvoirs*; four bridges with many arches; seven bridges of one arch; and had constructed three roads. Of all these works may be noticed a *colonne crucifère* at Rupt en Woëvre, and a Gothic portail at Murvaux, on the frontier of the Pays Bas. His works since 1830 are not stated. He published numerous essays chiefly relating to the objects of art in the museum at Bar-le-Duc. He had many pupils who are stated to have risen to eminence. He died about the middle of 1865, and was buried at the expense of the town in honour of his services. The *Echo de l'Est* gives a short necrology, reprinted in Daly, *Revue Générale*, 1855, xiii, 184-5. 68. 110.

OUDEYPORE, Odeypoor and Odeypore, in the province of Ajmeer, or Rajpootana, but formerly in that of Mewar, in Hindustan; see Udaipur.

OUDOT (Jean) was employed 1511 with Jean and Huguenin Bailly, and Grand-Jean, to report on the works at the church of S. Jean at Troyes; Assier, *Compte de la Fabrique*.

OUEN L'AUMÔNE (Saint), clos du roi, carrière de M. Maitre, was the quarry whence probably abbot Suger obtained the stone for the abbey of S. Denis. It is situated in the Val Armé or Valhermay, in Pontoise. Daly, *Revue Générale*, 4to., Paris, 1852, x, 275, pl. 13 and 15.

OUGHRINGTON quarry, near Lymm, in Cheshire, is a triassic or new red sandstone, which was probably used in the portico of, and in, S. Peter's church at Manchester.

OUGUET, AQUÈTE, HUET, HUGUET, or HACKET. The presumed name of the supposed architect of the Batalha in Portugal. At the end of the list of subscribers to Murphy, *The Batalha*, fol., Lond., 1795, is a note that "the architect of the building was an Irishman named David Hacket, who then lived in Vianna da Caminha, as may be seen in one of the *Memoirs* of Ant. da Madureira, a Dominican friar and a celebrated genealogist." This statement was contributed to Murphy as taken from de Sousa's work, and from another; Murphy's text is largely taken from de Sousa, *Historia de S. Domingos*, part 1, fol., Lisbon, 1767, but he had not inserted the statement. It has been supposed that this Hacket was the David Hacket, bishop of Ossory, 1460-79, who did much to his own cathedral; Graves and Prim, *S. Canice, Kilkenny*, 4to., Dublin, 1857, p. 36; and Notes and Queries *Journal*, 1854, 1st Ser., x, 29. Murphy, *Travels in Portugal*, 4to., Lond., 1795, p. 44, the same year as his other work, gives "Stephen Stephenson, a native of England", as the name of the architect. Soares da Sylva, *Memorias—del rey D. Jôo I*, 1380-1433, 4to., Lisbon, 1730-34, ii, 533, referring to the work by da Sousa, quotes, "e só direz de mais, que foy Mestre della hum Irlandez, que cutaõ vivia em Vianna de Caminha, e se chamava David Aquete," etc. Menezes, conde de Ericeira, *Hist. ab anno* 1640-57, 4to., 1734. Batalha.

Raczynski, *Les Arts en Portugal*, 8vo., Paris, 1846, controverts this assertion of Murphy's, and gives the names of Dominguez, Ouguet, Vasquez, etc., as employed on the edifice, which was commenced 1388: in his *Dict. hist. Artist. de Portugal*, 8vo., Paris, 1847, he remarks that this Hacket may be the same as "Huguet, Huet ou Ouguet, architecte Anglais, maître des travaux de Batalha depuis 1402" to about 1451; and in *Lettres*, 4to. and fol., Paris, 1836, p. 225-6, 332. Le Patriarche, *Liste des Artistes*, i, s. v. Architectes, article Mestre Huet, Huget or Ouget, presumes that he died about 1438, and states that the first document relative to this artist was dated 1402: which is the same year as that given by him as the date of the death of the presumed first architect Alfonzo Dominguez, of Lisbon. The remarks by Llaguno, i, 155, on Murphy's assertion, should be consulted. 15. 66. 88.

OUNDY or UNDY. The name applied to a projection, as a corbel table, the under edge of which has a wavelike outline; as seen in some Norman buildings. Undulated moulding. Nebule moulding.

OUPENSKOI, see Bolgary, in the province of Kazan.

OUS. The Greek term for the console or ear ornament to the hyperthyrum or door dressing, facing the east, as named in the Survey of the state of the works at the Erechtheion at Athens: Inwood, *Erech.*, p. 96. Croisette. Ear.

OUT BAND, see In and Out band.

OUTCROP. In Geology, is applied to the edge of the strata; but the miners' term Basset is now applied to all the outcrop of whatever mineral substance is contained in the strata. In engineering, this is the name now given to the outcrop or edge of work appearing first above the surface of the ground, or just over the foundation. In Raine, *History of Blyth in Notts. and York*, 4to., 1861, the term *basset* or *berset* is explained as meaning sloping; and it is further stated that in the quarries which supplied the stone for the Houses of Parliament, the contractors "won stone too near the basset edge, instead of working deep, and hence the cause of decay": Builder *Journal*, 1861, xix, 60.

OUTER DOOR. A door common to both the exterior and interior sides of a building. 1.

OUTER PLATE. The wall plate, in a double plated roof, which lies nearer the outer surface of the wall. 1.

OUTHOUSE (Fr. *Dépendance*). An enclosed shed, generally a lean-to, erected in a court or yard adjoining to a dwelling, and used for domestic purposes.

OUTLINE. The line which bounds the contour of any object. It is the fundamental principle of drawing. "If a man made up his mind to be an illuminator—if he possessed the gift of arranging colour, and his opportunities and time did not admit of his making himself a good painter—then let him take up this principle, that every form he drew must be in pure colour without shadow. He might use what colours he pleased, but let him not resort to shadow in any shape—the object should always be represented in gradated pure colour with true outline." The first step was to be perfect master of outline. Outline was susceptible of great beauty and infinite variety; but it must be firm and true: not thickened on the side opposite to the light, with a view of showing something like a shadow. It must not be shadowed at all. Nothing could be more absurd than to attempt to throw in shadow by thickening the line, for if the outline was ever lost, it would

oftener be on the dark side than on the light side. Besides, the veracity of the line would lie within the compass of a hair. It must be right or wrong. If right the thickening of the line destroyed the correctness, and the thickness must be removed before the outline could be true, the truth lying somewhere within the thick line. The first thing to practise was perfectly faithful outline, and an important thing to know was how much could be expressed by it"; RUSKIN, *Lecture*, read at the Architectural Museum, printed in CIVIL ENGINEER ETC., *Journal*, 1854, xvii, 458; which, xviii, 49-51, gives his *Lecture* on *The General Principles of Outline:* also BUILDER *Journal*, xii, 613. BURGES, *Architectural Drawing*, read at Royal Institute of British Architects, 19 Nov. 1860.

OULTON STONE. Oulton is a village near Leeds, and near to the Woodlesford station on the Midland Railway. The stone is of two kinds, viz.:—A brown top stone, and a blue low stone. The brown stone is a soft ferruginous sand-stone frequently stained with peroxide of iron, and consequently is only used locally. Moreover, it cannot be recommended as a weather stone, although frequently used as such in the locality where raised. The low or blue stone is also a fine grained sandstone very extensively used all through the provinces and in London. Being a pure block stone (*i.e.* an homogeneous mass, showing little or no lamination), it can be put into the sawmills and cut into slabs for chimney pieces, and for steps. It is used more largely than any other stone by speculating builders, as it is cheap and easily worked: but it has not that fineness of texture and colour which the Robinhood and Greenmoor stones possess, being (like the upper stone) frequently stained with iron-stone nodules, and it is not so valuable a stone. S. T.

OUT OF WINDING. A term used by artificers to signify that the surface of a body is a perfect plane. Thus when two straight edges applied in every direction to the surface are found to be in the same plane, the surface is said to be out of winding. 1. 2.

OUTRÉ. A French term for any work that may be exaggerated, fantastic, or absurd; as in drawing, when the outlines are hard and strongly marked; and in colouring, when the colours are over strong and dominant. BAROQUE; BIZARRE; and ROCOCO. 5.

OUTSIDE LINING. As of a sash frame, is the portion of the frame placed next the reveal in the brickwork and generally beaded on the one edge, which prevents the upper sash from falling out when sliding up and down. There are three linings, the outer, inner, and back, lining. 1.

OUTSIDE STILE. As of a door, is the upright portion of the framework of a door; there are two, the shutting stile, and the hanging stile. 1.

OUT TO OUT. An expression used when the dimensions of any body or figure are measured to its utmost bounds. 1. 2.

OUYN (GUILLAUME), was 1467 master of the works of masonry and carpentry to the city of Paris. CALLIAT and LEROUX DE LINCY, *Hôtel de Ville*, fol., Paris, 1844; and Supp. 1856.

OVAL. An oblong irregular figure formed by a continuous curve, or curves, narrower at one end than at the other, and having its length greater than its breadth. It differs from the ELLIPSE, the mathematical oval, which is equally broad at both ends. It is sometimes called a false ellipse; and is usually stated to be compounded of parts of a circle. The egg, tun or barrel, eye, and nut form, are oval shapes, given in RECORDE, *Pathway to Knowledge*, 4to., Lond., 1551; 1602. SERLIO, *Architectura*, fol., Venice, 1663, p. 18-24, gives woodcuts of methods of drawing ovals for arches and vases; also the BUILDER'S DICTIONARY, 8vo., 1734, s.v.; and NICHOLSON, *Arch. Dict.* 14.

The use of a portion of an oval or of an ovoid or of the curve of an ellipse, for determining the line of the intrados of a *vault*, or a *dome*, is so rare in buildings of the present time that it is worth while to notice that this seems to have been a favourite custom with the architects employed by the Sassanide dynasty (A. D. 226-632) in Persia, as evinced by the remains described with illustrations by FLANDIN and COSTE, *Voyage en Perse*, fol., Paris, 1844-51 (Perse ancienne), pl. 28-9, 39-42, 216-8, and 223; viz. the palace at Serbistan, having porches and galleries 30 ft. 6 in. span with a dome 42 ft. span, and 68 ft. 3 ins. high from the pavement (texte ii, 376); that at Firouzabad having a porch 43 ft. 8 in. span with three domes of the same diameter, and 77 ft. 1 in. high from the pavement (texte ii, 345-8); and the Tak (or Takt) i Khesra, which now indicates the site of CTESIPHON, where there still exists the celebrated elliptic vault of 116 ft. deep, 74 ft. span, and 92 ft., high from the pavement (texte ii, 505-6). To these must be added the *bridge* at Altoun Kupri, between Kerkouk and Mosul, 65 ft. 8 ins. span rising 50 ft. from the banks, and showing in its front three courses altogether 3·28 ft. thick breaking joint (texte ii, 223). The above mentioned domes have central eyes like the Pantheon at Rome. The figure of the interior of the dome of the church of the collège Mazarin at Paris is of this form. ELLIPSE.

Buildings have been designed of an oval form; several are named s. v. Ellipse: another at Rome is the church of S. Carlo a quattro fonte by Borromini, given with the others, in ROSSI, *Insignium Romæ Temp.*, fol., Rome, 1684. The protestant church at Munich, 143 ft. by 57 ft., is by Pertch. The old chapel, nearly an oval, at Worcester college; and the kitchen with a fine arched roof, at All Souls' college, by Dr. G. Clarke, both at Oxford. The corn exchange, at Leeds, 1861, 190 ft. by 136 ft. outside, by C. Brodrick; BUILDER *Journal*, xix, 648-9. The Albert hall, Kensington Road, 1867-70, 320 ft. by 308 ft., by capt. Fowke, and completed by major general Scott.

Ancient examples of so-called *oval columns*, where the semicircle of the columns is elongated by a broad plain space on the two opposite sides of the shaft, are seen in some fragments found in the isle of Delos by LEROY; and another from the site of the temple of Diana at Ephesus by J. T. WOOD, *The Temple, etc.*, fol., Lond., 1877; as given in *Sessional Papers*, Royal Institute of British Architects, 4to., Lond., 1877, p. 83: but these are better called ENGAGED COLUMNS; CLUSTERED or inosculated: another in the tomb at Mylassa near Boudroum in Asia Minor, is stated to have in each front two oval fluted columns with the narrow face outwards. There are two oval columns at the church of S. Trinità del Monte at Rome; PIRANESI, *Magnificentia*, fol., Rome, 1761, who gives the capital, pl. 6, fig. xii; a plan "A, vestigium hypatrachelij columnarum, quibus imposita erant eadem capitula"; and another plan "B, Idem vestigium a Le Royo immutatum." Such are the columns of the lower order to the church of Pères de la Merci at Paris, by Cottar: those to the church of S. Alphage, London Wall, 1774-7, by G. Dance, Jun., are somewhat more than semi-oval.

An *oval window* (Fr. *Œil de bœuf*), of the early English period, is to be seen at Stanford Dingley church, Berkshire. A semi-oval arch is to be seen in Whitchurch church, Denbighshire; WILLIAMS and UNDERWOOD, *Denbigh. Churches*, 4to., 1872.

OVAL or tubular GIRDER; see GIRDER, p. 38a.

OVEN. A place in which heat is created, chiefly for baking. A proper oven for bread is not made of iron but built of brick; it is about 4 ft. by 3 ft. inside, either round or square, and from 18 ins. to 24 ins. high, and is lined with firebrick. Wood fuel is burnt in the oven till it is sufficiently heated, and then the ashes are swept out; a flue towards the front of the oven carries off the smoke; the bread is put in and then the flue serves to carry off the steam. An iron oven, on the contrary, is heated by means of a small furnace underneath. A dresser at the window for making bread, a trough for kneading, and a flour chest next to it, are necessary adjuncts to an

oven in a BAKERY: KERR, *Gentleman's house*, 8vo., Lond., 1865, p. 240. A specification for an oven will be found in PEWTNER, *Comprehensive Specifier*, 8vo., Lond., 1870. A complete brick oven for a dwelling, with a specification, is given in BUILDING NEWS *Journal*, 1860, vi, 765. URE, *Dict. of Arts, etc.*, 6th edit., 8vo., Lond., 1867, s. v. Bread. Ovens for wood and coal, and for various purposes, are given in ROLLET, *Mémoire sur la Meunerie*, 4to., plates fol., Paris, 1847, pl. 43-48: and in URE, *Dictionary*, etc., 8vo., Lond., 1875, seventh edition.

The oven used in Egypt for hatching eggs is given in WILKINSON, *Topography of Thebes*, 8vo., Lond., 1835, p. 246: the arrangement consists generally of about 8 or 10 ovens on each side of a passage about 100 ft. long by 15 ft. wide and 12 ft. high.

OVERAIGNE. A term used in the Fabric Rolls 1315 of the palace at Westminster, for a gutter; BRITTON AND BRAYLEY, *Ancient Palace*, 8vo., Lond., 1836, p. 112. 19.

OVER DOOR (Fr. *dessus de porte*). A general term given to the decoration or ornament placed above the frame of a door, which generally speaking is only used in the interior of buildings, in the form of canopies, panels, compartments, pictures, bas-reliefs, or framings. These decorations ought to be in proportion to the size of the door and in conformity with the general style of the other work. 5. 25.

In outside work, as in Elizabethan and Jacobean architecture, the term CORONET has been given to this decoration; *Illustrations*, s. v., 1848-49.

OVERFALL of a weir (Fr. *décersoir*). The fall of water from an upper to a lower level of a river or lake.

OVERFLOW PIPE; see WASTE PIPE.

OVERHANG. (Fr. *contrefruit; forgeter; sur plomb*). When a wall is not upright but leans forward, it is said to overhang. An oriel or turret projecting beyond the face of a wall, is also said to overhang. It is accepted as a general rule that an overhanging wall is dangerous when the centre of gravity overhangs the base. 5. 25.

OVERHARDE. This word is used in a will, 1509, where the body is directed to be buried "before the rood of Pity in the overharde" of the abbey church at Faversham; NICOLAS, *Test. Vest.*, 8vo., Lond., 1826, p. 487. It may be a misreading for churchyard. 19.

OVERSEER. (Lat. *supervisor*; It. *visitatore*; Sp. *aparejador; veedor*; Fr. *inspecteur*; Ger. *aufseher*.) Formerly it was usual to appoint some dignitary of the church to preside over the king's works, of which examples are here given, hence translators of the Latin word have usually applied the terms "surveyor" and "overseer" to it.

1004 W. Herbert and others, *appares* or *apparitores*.
1307 M. James de Leuesham.
1356 William of Wykeham, *supervisor* at Windsor Castle.
1370 Thomas de Staple, overseer of the king's works at Quenesburgh castle, DEVON, *Brantingham Rolls*, 4to., Lond., 1835, p. 389: 417.
1446 N. Cloose, overseer and manager at King's College chapel; John Langton another, was made bishop of S. David's in 1447.
1479 Dr. Field, provost of Winchester College, Cambridge, overseer of the works at King's College chapel, in that city.
1484 Thomas Cliff was appointed by king Richard III.
1577 R. Kirby, steward of the house and overseer of the works, £10 for encouragement to see the workmen do their duty.
1627 John Johnston, surveyor of the bridge work at Newcastle, reputed skilful in those works, etc., was paid 2s. per day by the bishop of Durham, "to see that the work of the new bridge should be done truly, faithfully, and substantially, according to the articles in all points"; FULLER, *Hist. of Berwick*, 8vo., Edinb., 1799, p. 231.
1766 Semple was "overseer", at his bridge in Dublin,—the builder or mason, Mack, being the "undertaker".

OVER STORY, Overhistorye, Ovyrstorye, and Ovystorie. An upper story; the CLEAR STORY of a church. WILLIAM OF WORCESTER, *Itin.*, 1480, p. 78, 82, 222, etc. DALLAWAY, *Discourses*, 8vo., Lond., 1833, p. 173. 17. 19.

OVERSTRAETEN-ROELANTS (LOUIS VAN), born 1817, designed 1845-53 the church of S. Mary of the Assumption, in the rue Royale in the suburb of Schaerbeek, at Bruxelles; which is said to be a medley of the romanesque, pointed and renaissance styles. He died 1849.

OVIEDO (*Lucus Asturum* and *Ovietum*). The capital of the province of the same name and of the Asturias, in Spain, is situated at the confluence of the two small rivers, the Ovia or Ove, and the Nera. The projecting roof seen in most of the buildings is rendered necessary by the dampness of the climate. Among the deserted mansions of the nobility, is that of the duque del Parque, now a weapon factory; of the marquis Campo Sangrado, a fine square building; the casa Solar of Toreno, the historian; and one in the calle de la Plateria. The remains of *la Corte*, the residence of king Alonso el Casto, *cir.* 810; this, the fortaleza, was added by Alonso III el Magno, to protect the relics of the cathedral from the Normans *cir.* 862 or 875; the chief part was pulled down to form the cloisters.

Oviedo was 810 the seat of a bishopric, raised 901 to an archbishopric removed to Santiago; it is now again a bishopric. In the city are some of the earliest Christian churches in the peninsula, in consequence of the great number of ecclesiastics who took refuge here from the Moors: they are Romanesque in style, called *obra de Godos* in order to distinguish it from the Pointed style called *obra de Tudesco* or *Tedesque*. The small cathedral dedicated to S. Salvador was rebuilt 1388, and is perhaps equalled by none in the Peninsula. It is cruciform in plan. The chapels on each side of the choir were completed 1479 by J. Candamo de las Tablas: there is a triforium (an unusual feature); the *retablo* dates 1440; the Lady chapel, now the *cappilla del rey Casto*, was pulled down 1712 and rebuilt; the bodies of fourteen kings and queens of the Asturias are deposited therein. Of the two west towers, the one completed is 200 ft. in height, a spire of open work was added 1575. The cloisters are small but have rich tracery The *camara santa*, or original primitive chapel of San Miguel, is all that remains of the edifice founded 781 and enlarged 802. It is concealed between the cathedral and the cloisters, and adjoins the old tower: twenty-two steps ascend from the south transept to a square vestibule with a groined roof, the archway having Romanesque sharply cut sculpture, this leads by a descent of five steps to the chapel about 22 ft. long by 13 ft. 9 ins. wide, and 21 ft. high: six coupled statues of the apostles serving as pillars of the same date support the barrel roof; the pavement resembles those of Norman-Byzantine work in Calabria and Sicily of the 9th century. The relics, placed in the plain sanctum beyond, which is raised one step, exhibit early art. The plan, section, and details are given in pl. 11 of the fine work published by the Spanish Government, *Monumentos arquitectonicos de España*, fol., Madrid, 1859, etc.; the exterior in the text; pl. 32 gives the old tower; pl. 6, 7, and 8 the chest containing the relics, antique crosses, etc.

The churches best preserved are on the hill *La Cuesta de Naranco*;—Sta. Maria de Narango, by Fioda or Tioda, has a portico; the centre aile is the lowest of the three; the main part is 40 ft. long by 15 ft. wide: CARBALLO considers that some of the columns were brought from a Roman temple at Lugo. S. Miguel de Linio (*vulgo* Lino) cruciform in plan, appears to have been originally a miniature church with all the usual accessories; it is said to have been built for king Ramiro I, *cir.* 850, by Tioda. These two churches are given in pl. 9, and ii, pl. 1 and 8, of the above-named work. MORALES, *Viage*, p. 103, describes 1572 the ruined traces of the adjoining palace of Ramiro, fragments of which are encased in the more modern buildings. The church of San Julian or Santullano also outside the town, erected by Tioda, cir. 800, has three ailes, Byzantine in character, though CAEN BERMUDEZ calls it Tuscan. Neustra Señora de la Vega near the town was founded *cir.* 1186, has two tombs. This church with that of Sta. Clara; S. Juan, which has a billet moulding round

the front; and that of N. S. de la Vega, are given in ii, pl. 6, of the above-named work. San Tirso, *cir.* 800, but modernised, of which a double arch with columns in the exterior wall is all that exists; San Payo close by, originally founded by king Alonso el Casto to S. John the Baptist: the huge double convent of San Vincente, founded 1281 for Benedictine monks and nuns: the large Dominican church built 1553 by J. de Cerecedo, to which *cir.* 1780 a tower and portico were added by M. Reguera Gonzalez, who amongst other edifices in the city designed *cir.* 1764 the nave of the parish church of S. Isodoro, all deserve notice.

Among the civil buildings are, an old pilgrim's hospital once the palace of Alonso III; a *casa consistorial*, a handsome edifice *temp.* Philip II; a *Universidad literaria* founded 1580 (Doric), 1611, containing a library of 12,000 volumes, with a museum of fauna and mineralogy; various charitable foundations, of which the most conspicuous is the magnificent *hospicio provincial* (Doric), 1770 by P. Menendez, for foundlings, orphans, the deserted, and leprous of both sexes: its church with the cupola 1768 by V. Rodriguez, completed by M. Reguera Gonzalez: a good but small theatre; and a casino. A stone aqueduct, *los pilares*, of forty-one arches supplying the town with water, was erected 1553 by J. de Cerecedo, and altered 1559 by G. de la Barsena. Minano, *Dic. Geog. di España, etc.*, 4to., Madrid, 1826-29. Florez, *España Sagrada*, Madrid, 1754. Ponz, *Viage de España*, 8vo., Madrid, 1776-94. Gonzalez Davila, *Teatro Ecclesiastico de Oviedo*, 4to., Mad., 1695; and *Patrocinio Medrano*, fol., Oviedo, 1719.

Near Oviedo is the former imposing convent of San Francisco, now a hospital for 200 patients; with cloisters and a chapel. The Santo Domingo with its groves is also a hospital. *Las Caldas* (calidas), the warm baths, were erected 1731-80 by M. Reguera Gonzalez. In the neighbourhood are some of the richest and most extensive coal-fields of the peninsular. Tombs in the cloisters of the collegiate church of Covadonga; and the parish church of S. Juan de Priorio, are given in the above-named government work. 28. 50.

OVIEDO (Fernando de), *aparejador* at the cathedral of Oviedo, was 3 July 1651 nominated *aparejador* of the works at the chapel of the sagrario in the cathedral at Seville, on the death of Zumarraga. It was apparently in his time that a crack was observed in the *arco toral*, and the *maestros* recommended that it would be better not to place a lantern upon the dome; as explained in Llaguno. 66.

OVIEDO (Juan de), born 21 May 1565 at Avila, was the son and grandson of the two Juan de Oviedo who removed from Gijon in the Asturias to Avila. He became a pupil of his uncle Miguel Adam (having previously studied mathematics), and adopted to a great extent the style of design of G. Fernandez. About 1587 Juan was appointed *maestro mayor* of Seville, and subsequently a jurat. He designed the altar pieces of Llerena, of Azuaga, of Constantina, of Casalla y Moron; that of the Biscayans in San Francisco, and many others: the noble temple of the Merced, and that of the nuns of the Assumption of this order, that of S. Benito and S. Leandro, and many of their houses and offices; and especially the famous tomb of king Philip II., the greatest work in Spain, and that of queen Margarita, opposite each other, erected 1598 in Seville cathedral.

Upon entering the service of the city, he put the drains in order, preventing the influx of the river water, and abolishing the old contrivances. In the inundations which took place prior to the adoption of his measures for their prevention, he displayed the greatest energy in alleviating their consequences, risking his life in so doing. He, with his servants, was particularly active at fires, especially at that of the Contratacion and of S. Bernardo, where he rushed through the flames to the powder magazine, and bursting in the doors with an axe, came forth with a barrel of powder in his arms. He designed and directed 1617 a work of great importance, the diversion of the river Guadalquiver 300 paces northwards from the city at the site of the Almanilla, now the "Gate of S. Juan", preventing the destruction of the city threatened in frequent inundations. He also made many improvements in the city, and took upon himself the entire supervision of the works, instead of employing overseers. After seventeen years of active employment in the interest of the city, he was rewarded by the continuance to him of his pay: to it he made over all his savings, a benefaction of more than thirty-eight thousand ducats; and also to the king more than forty thousand, by putting the coast of Andalusia into a state of defence, and completing forty towers which had been commenced thirty years previously, narrowly escaping three times being taken prisoner. On the day of S. Lorenzo, 1613, assisted only by three unarmed foot soldiers, he made prisoners of thirteen Moors near Cadiz. From this time, while taking part in many important military operations, he devoted his talents as an engineer to the construction of various fortifications, some of which he erected at his own expense. In 1617 he was rewarded by Philip III with the Order of Montesa and six hundred ducats per annum. Engaging in the conquest of Brazil, he, whilst in front of the troops as engineer-in-chief, was struck on the leg by a cannon ball, and survived only two hours, dying in 1625. 66.

OVOLO. A convex moulding, often decorated with the egg and anchor; also called by workmen a quarter round, and boltel and boultin in writings *cir.* 1736 (It. *uovolo*, dim. of *ovo*; Sp. *ovalo*; *quarto-bozel*; Fr. *échine*; *quart de rond*; Ger. *wulst*, and with the bead *eierstab mit perlen*). The Greek form of this moulding is called echinus. Some writers, as Serlio and others, have considered the ovolo to be the same as the astragalum lesbium of Vitruvius, but that is now decided to be the bead and reel. A reversed ovolo, Fr. *bec de corbin*, is the bill-headed iron, of the dictionaries and Virloys. The correct spelling of the word is no doubt Vuovolo, as in p. 232, 263, of Serlio, *Archit.*, fol., Venice, 1633, who p. 233 has "echino detto vuouolo", and in Latin "qui oviclum"; "vulgo oviclum", p. 254; and "cymatio seu oviclo"; and 'cimatio detto uouolo", p. 238: it is also so spelled in Vasari, *Vies*, Florentine edit., 1857, vii, 211. An elaborate method of drawing the decoration of the egg and anchor, into which this moulding is generally carved, is given in Langley, *Builder's Assistant*, 8vo., Lond., 1738, pl. xvi.

Aquinus, *Vocab.*, 4to., Rome, 1734, s. v., mentioning the marine and the terrestrial urchin, adds "In architectura *echinos* dicimus tegumenta castanearum, ad eamdem formam spinosa. Ea verò adaperto cortice seriatim disposita capitulis Dorici, Ionici, et Compositi ordinis adscalpuntur. Id genus ornamenti, quoniam ovis admodum simile est, appellamus *ovoli*. In Tuscanica symmetriam eadem pars, sive planum, quod est inter plynthum, et anulos, licèt echinis careat, adhuc nominatur *echinus*, et Italis *ovolo*. Adhibentur etiam *echini* in cymatiis, integra, vel dimidiata scalptura; iisque hamata spicula interponi solent, quasi ad eosdem scindendos. Dicimus etiam tectum *echinatum*, vel quod spissis scabrisque tegulis componitur; vel quod coronides habet ex opere echinato."

Cæsariano, *Vitruv.*, Como, 1521, has, 17a, "lo echino seu ovo"; where Caporali, *Vitruv.*, Perugia, 1536, has "lo ovolo". Also "*Echinus*; una tabella et uno echino di soto come una cratera coperta de uno abacho Dorico", in Ces. fo. 5*b*, and on the same page "à lo echinato catulo aut a lo pulvino balteato", where Cap. 9*a*, has "una tavolella et uno ovolo di sotto come una cratera coperta d'uno abaco Dorico": and "al ovato catulo o vero al suo letto baltheato". Ces. 53*a*, has "lordine del echino", where Cap. 83*b* has "l'ordine de l'ovolo". Ces. 48*a*, has "lo echino seu ovo", where Cap. 90*b*, has "echino cioe ovolo". And Ces. 65*a*, "Et cum sia almeno necessario constituire li echini nam ἐχῖνον græce latine dicitur vas æreum mensæ judicialis in quo littere reponebantur ma de quisti echini tri", where Cap. 93*b*, has "Et e necessario vi siano con-

stituiti gli echini et essi *εχινον* grece in latino son detti vasi di rame delle mense giudiciale na i quali si reponevano le lettere ma di questi echini cioe ovoli tre. . . . ."

"The enriched *ovilla* of the *epistylium*, without a fillet, are found only to occur in buildings of the best period of [Grecian] architectural composition"; Society of Dilettanti, *Antiq. of Ionia* (Cnidus), fol., London, 1840, iii, p. 36. Some writers apply the Latin word *oviculum* (Fr. *ovicule*) the diminutive of *ovum*, to the round moulding in the Ionic and Composite capitals, which is usually carved. 25.

OVYRHISTORYE, see Overstory; and Clearstory.

OVUM. The Latin name for the ornament in the shape of an egg, into which the *echinus*, and ovolo moulding, is often carved. Ovolo. 1. 2.

OWEN (Jacob), was born 1778 in North Wales, and served under William Underhill, an engineer much engaged in canal works, principally in South Staffordshire. In 1804 he was appointed clerk of the works in the royal engineer department at Portsmouth, and was transferred 1832 to the Irish Board of Works in Dublin, as principal engineer and architect, which appointment he held until 1856, when he retired, and died at Southsea near Portsmouth in 1870. Among his numerous designs are 1848 the criminal lunatic asylum at Dundrum, near Dublin, given in the 16th report of the Board of Public Works 1848; Mountjoy prison; and additions to the Four courts and the record buildings, Queen's Inns, in the same city: and several model schools and other government buildings throughout the country. Having married the daughter of his master, he had a son Jeremiah, metallurgist to the admiralty, and store receiver at Woolwich dockyard; Thomas Ellis, architect at Portsmouth, and a surveyor for the South Hants districts, through whose exertions mainly the watering-place of Southsea was built, who died a few days after his second election as mayor of Portsmouth, December 1862; the rev. Joseph Butterworth, late vicar of S. Jude's, Chelsea; David Price, also in the royal engineer department; William Henshaw, architect and civil engineer, practising at Limerick; Henry, some time county surveyor at Waterford; and James Higgins, who succeeded his father as architect to the Board of Works. The fourth daughter married Sir Charles Lanyon, architect and civil engineer, of Belfast. J. H. O.

OWL. This bird was an attribute of the goddess Minerva, and was typical of serious meditation. A fine antique example is in the Elgin collection at the British Museum. In Christian art, the owl is an emblem of darkness and solitude. The fathers regarded it as a symbol of incredulity. A mediæval representation is given in Viollet le Duc, *Dict.*, s. v., Crochet, 405. Schliemann, *Troy and its Remains*, 8vo., Lond., 1875, refers to the "owl-faced goddess".

OWNER, together with building owner, and land owner, are terms now commonly used in Acts of Parliament. In the Metropolitan Building Act 1855 it is stated that the word "owner shall apply to every person in possession or receipt either of the whole or of any parts of the rents or profits of any land or tenement, or in the occupation of such land or tenement other than as a tenant from year to year or for any less term, or as a tenant at will". Part iii of this Act refers to the "rights of building and adjoining owners".

OWSIANNIKOW (Michel). The name of a draughtsman on two plates of the château S. Michel at S. Petersburg, given in Brenna, *Disegni*, fol., S. Peters., (1800?)

OX. This animal has been considered by the church as an emblem of the priesthood. In the representations of the Nativity of our Lord, an ox and an ass are always introduced; by the former the Jewish people are said to be typified, and by the latter the Gentiles. The ox is an attribute of S. Luke; sometimes it replaces the Evangelists, and then it has a nimbus. The winged ox is the symbol of S. Luke, in allusion to his dwelling most on the priestly character of the Saviour, that animal being the emblem of sacrifice. It is also the emblem of SS. Frideswide, Leonard, Sylvester, Medard, Julietta, and Blandina. Fairholt, *Dict. of Terms*, 8vo., Lond., (1870).

Colossal figures of bulls, in the mountains of Guadarama, are referred to by Livy and Polybius. Sculptures of kneeling bulls at Shapour and Persepolis, are given in Flandin, *Voyage en Perse*, fol., Paris, 1844, and texte, ii, 280. The winged human-headed bulls of Nineveh, are engraved in the publications of Layard, Botta, Bonomi, and others. In Egypt, the heads and principal bones only of the sacred bull and ram, and some others were embalmed, but frequently the whole body was preserved, as the sacred bull Apis, at the ancient Memphis.

Bucranium or ox head; Bull's head. Head. One of the side portals of the *duomo* at Borgo S. Donino has bull's heads in the capitals for "sol in tauro" of the zodiac.

OX-EYED ARCH. The name given in Langley, *Bricklayer's Work*, etc., 8vo., Lond., 1750, p. 219, 240, to one of two forms of Gothic arches, the other being the "hanched", or the four-centred; the former is two-centred, and rising higher than half the width. The term has been supposed to have been derived probably from Gr. ὀξίς, genitive ὀξίδος, a vinegar cruet, from ὀξὺς sharp, acute, pointed, acid, piercing. Moxon, as quoted below, p. 39, observes that "oxi, which being but part of a word, is taken from the term *oxigonium*, signifying an equilateral triangle with three sharp angles".

The ox-eye, a sort of oval form, is shown in Langley, *Builder's Assistant*, 8vo., Lond., 1738, pl. 1, as a segment on each side of a line and meeting at it; in form like a vesica piscis.

The stonework props or "ox-eye masonry" put up about 1712-21 between the arches of the tower of Hereford cathedral were removed cir. 1850-51.

OX-EYE MOULDING. A form somewhat similar to the cavetto or casement. Moxon, *Mechanick Exercises* (Bricklayer), 4to., Lond., 1700, p. 29, and pl. 7, shows in fig. 2 that the ox-eye is somewhat deeper than the casement, the circle being struck from a centre of a circle the diameter of the intended form, and thus returns at top and bottom.

OXFORD. A city and university and the chief borough in the county of Oxford in England, is situated on the rivers Isis and Cherwell; over the former is Folly bridge, *c.* 1830; over the latter is Magdalen bridge, 1771-82 by J. Gwynn, R.A., consisting of two sets of four arches connected by a causeway 200 ft. long, making a total length of 526 ft.: it is 28 ft. wide. The streets are mostly narrow and irregular except the High Street, which is 3000 ft. long and 85 ft. wide at its greatest width; with its line of public edifices etc., "it has not its equal, as a street, in any town in Europe" (Waagen; a view from a photograph is given in the Building News *Journal*, 1858, iv, 61). The old houses deserving of notice are the remains of bishop King's house; Kettel hall; and Wolsey's almshouses, now in course of conversion into a private residence, etc. Of the castle, built 1074 (King, *Vestiges*, fol., Lond., 1796) there remains one of the towers or the keep, having sloping walls (Illustrated London News, 1847, xi, 13); part of the town wall rebuilt (*c.* 1375) by bishop William of Wykeham is a very fine example of town walls of that period: he covenanted with the city that they should be kept in repair for ever. The "parks" were laid out 1863 at an expense of about £10,000. The Martyrs' (1555-6) Memorial, a Gothic cross (Decorated) 1840-1, is by G. G. Scott and Moffatt.

In the following description the reference B. *J.*, is to Builder *Journal;* B. N. *J.*, to Building News *Journal;* C. E., to Civil Engineer, etc. *Journal;* I. L. N., to Illustrated London News.

The diocese of Oxford was formed 1542 and subsequently enlarged. Of the twenty-two churches the following are the most noticeable:—The cathedral, dedicated to S. Frideswide, is also the chapel of Christ Church. It is principally Nor-

man. The shrine of S. Frideswide with the watching loft is curious (B. N. *J.*, 1876, xxxi, 100, 142). The chapter house (Early English) has a doorway of rich Norman work. The remains of the cloister (Perpendicular) restored 1874 by Sir G. G. Scott. An underground chamber, discovered 1856-7, was described at the Oxford Architectural Society by J. H. Parker. Restorations and a new roof were made 1838: rearrangements 1856 by John Billing with new glass by — Gerente of Belgium (int., I. L. N., xxix, 299, 450); other repairs 1861 by E. G. Bruton; when the roof of the kitchen, the first building erected by Wolsey, was restored; repairs 1871 under Sir G. G. Scott to the chancel and the east wall rebuilt (B. *J.*, xxx, 829; xxxi, 850; xxxii, 903); and 1872 the nave lengthened 20 ft. at the west end. The length was 154 ft. (155ft. 6 in. Britton) now 174 ft.; the nave and ailes 54 ft. wide (52 ft. 10 in. B.); the transepts 102 ft. long and 24 ft. wide; the height of the nave 41 ft. 6 ins.: of the choir 37 ft. 6 ins. The tower is 144 ft. high (146 ft. B.). Willis, *Survey*, 4to., Oxf., 1727; 1730. Britton, *Cath. Antiq.*, 4to., 1821. Ecclesiologist *Journal*, 8vo., Lond., 1847, vii, 47-59. King, *Eastern Cathedrals*, 8vo. (Murray), 1861.

S. Mary Magdalen church, dates soon after the cathedral; the Lady chapel in the second south aile (early 14th cent.) has a crypt: the church is about 88 ft. long, its width being more: the tower was rebuilt with the south porch *c.* 1531: the Martyrs' aile, and the east end of the centre aile were rebuilt 1841 by Scott and Moffat: and reseated, etc., 1875 by W. Wilkinson.

S. Peter in the East is "said to be the most ancient structure in England not in ruins" (Dallaway, *Anecdotes*, 1800, p. 65); the chancel is of the ninth century; its crypt has four ranges of low columns: the remainder rebuilt temp. Henry V: restored 1876 by W. S. Champion, (B. N. *J.*, xxx, 492). Theobald, *Account*, etc., in the Archæologia, with three plates, 4to., 1770, i). S. Thomas, founded 1141; nave 13th cent.; north aile (Decorated) rebuilt *c.* 1845 by J. P. Harrison; chancel (Norman) rebuilt *c.* 1820; west tower is early 16th cent. work: it is about 100 ft. long. Holywell, is ancient; the tower completed *c.* 1464; its arch was cleverly pierced through the old wall and the ailes rebuilt 1845 by J. M. Derick. S. Aldate, 1004 (Speed), the nave is 15th cent., and chancel; Grymbald's crypt under the latter was built of stone from Hinksey quarry, disused since the reign of Henry III (Hearne); two ailes 14th cent., the south aile 1335-6; west tower and spire 13th cent.: the church about 100 ft. long, was restored 1832; alterations to the chancel 1855 by G. E. Street and J. C. Buckler; further alterations 1862-3 by J. T. Christopher (B. *J.*, xxi, 320), who rebuilt the spire in 1873. S. Giles; nave (early 13th cent.); clearstory 1538 or 1563; south aile (Early English); tower *c.* 1120, and 13th cent.: the church is 100 ft. long by 50 ft. wide; restored *c.* 1855 and the south chancel aile rebuilt by E. G. Bruton: Harrison, *Views, etc.*, fol., Lond., 1842. S. Michael; nave of 14th and 15th cents.; south aile 1260 and 1342; north aile 1524; chancel (Early English), restored *c.* 1855 by G. E. Street; the tower is by some supposed of Saxon origin, baluster columns being found in the belfry windows when repaired 1875 by E. G. Bruton (B. *J.*, xxxiii, 284). S. Mary the Virgin, also called the University church, chancel 1460, 68 ft. long and 24 ft. wide; nave *c.* 1488 of Taynton stone: the interior was rearranged with new stalls 1828, by Thos. Plowman: it was repaired 1848-49 with Taynton stone; and restored 1861-62 by Sir G. G. Scott, at a cost of £5,500; who 1863 also restored the south porch (Italian) with its twisted columns put up for archb. Laud 1637, by N. Stone sen. after a design by I. Jones, and cost £230. The steeple *c.* 1300, 180 ft. high, was wholly restored *c.* 1849 by J. C. Buckler; and the tower was bound by iron bars *c.* 1854 by Sir G. G. Scott: (Wickes, *Church Towers*, fol., Lond., 1859, i, pl. 10). All Saints (Corinthian); 1699-1708 of Headington stone, designed by dean Aldrich; 72 ft. long, 42 ft. wide, and 50 ft. high, without pillars; the tower and spire are Italo-Gothic in design: restored 1865 by E. G. Bruton: and the upper part of the spire *c.* 1875.

The modern churches comprise;—S. Peter in the Bailey; rebuilt 1875 on another site by J. T. Christopher. S. Martin or Carfax (Pointed); the body rebuilt 1820-22 by Harris and Plowman: modernised 1862 by E. G. Bruton: its tower lowered temp. Edward III. S. Clement (Anglo-Norman) consecrated 1828, is by D. Robertson, cost £6000; newly seated and the choir arranged, etc., 1874-7, by E. G. Bruton. S. John the Baptist at Summertown (Early English), 1833, by H. G. Underwood, cost £1,600; north aile added 1876 by G. E. Street. S. Paul in Jericho, (Greek Ionic), 1836, by H. J. Underwood and J. Johnson; 80 ft. long and 39 ft. wide; the apse added 1854 by E. G. Bruton. S. George district church (Gothic) *c.* 1850 by J. P. Harrison. S. Philip and S. James (Early Gothic), *c.* 1860-62, by G. E. Street, of Gibraltar and Box Ground stones; cost £7000 without carving and upper part of the tower; (B. *J.*, xx, 375; C. E. *J.*, xxiv, 281; interior B. N. *J.*, x, 142). S. Barnabas (Basilican type) 1867-69, by A. W. Blomfield; cost £6500, rough wall of local stones set in Portland cement; the bell tower 1871, 22 ft. square and 130 ft. high (B. *J.*, xxvi, 875). S. Ebbe (Pointed), rebuilt 1869 by G. E. Street; the old tower remains with a Norman door *c.* 1070. S. Frideswide in the suburbs (Early French) 1870-71, by S. S. Teulon (B. *J.*, xxix, 830): and S. John the Evangelist in the suburbs (middle Pointed) 1870, by E. G. Bruton; cost £1200. There are fifteen Dissenting chapels and a Roman Catholic church of S. Aloysius (Early Transitional), 1873-75 by J. A. Hansom and Son; about 130 ft. long, and 35 to 40 ft. wide (B. N. *J.*, 1873, xxv, 722, gives first design). The three cemeteries have each a chapel, all designed by H. J. Underwood; at Oseney (Early English),—S. Paul's or S. Sepulchre's (Norman), its lodge by E. G. Bruton;—and Holywell (Decorated); (B. N. *J.*, 1857, iii, 689. Underwood, *Working Drawings*, fol., 1850.)

The university had long existed as an establishment of European celebrity when it was incorporated by charter of 28th Henry III, 1244; it consists of twenty-one colleges and four halls—here placed in order of foundation.

University; refounded *c.* 1232, has two courts, one 100 ft. square. The hall begun 1640; interior modernised 1766; and the oriel renewed *c.* 1830. The chapel completed 1665, the screen and carvings over the altar by G. Gibbons; restored and partially rebuilt 1860-61 by Sir G. G. Scott, who at the same time designed the library, 70 ft. long by 27 ft. wide. The small court has only three sides, each about 80 ft. long; the master's residence was designed by Dr. Radcliffe, *c.* 1740.

Balliol; founded 1263, has a court 120 ft. by 80 ft.; to the west is a building forming with the old hall three sides of a quadrangle, erected 1769. The chapel rebuilt 1856-59 (Middle Pointed) by W. Butterfield cost about £8,000 (B. *J.*, xvii, 402). The library, west end 1410, renovated by J. Wyatt. The old hall remains for use as a library, etc.; a new hall (Geometric period) with kitchen, etc., beneath, with 23 sets of rooms, were built 1873-76 by A. Waterhouse, at a cost of £22,000, of Tisbury and Bath stones. The building at the south-west corner was erected 1769 by H. Keene. A building containing twelve sets of rooms was added 1825-6 by G. Basevi. A gateway and other (north) buildings, kitchen and buttery were built 1852 by A. Salvin, who partially restored the old quadrangle. The front next Broad Street (13th century), containing the master's residence and college rooms, was rebuilt 1866-69 by A. Waterhouse, of Bath stone, it is 240 ft. long with a return of 107 ft.; the cost was about £20,000: the fine ancient oriel has been preserved.

Merton; founded 1264 at Malden and removed to Oxford 1274 by Walter de Merton. The embattled tower entrance (1416) was restored 1838 by J. Blore. The new wing to the south-west 1863 (Middle Pointed) by W. Butterfield. In the

first court is the chapel, dedicated 1277; the choir *c.* 1300, the longest in Oxford except that of New College; the transept completed 1424. The original stained glass is in nearly a perfect state; some other portions are 1700 by W. Price. The sacristy dates 1310. The treasury is a stone roofed fireproof room of the fourteenth century. Various improvements were made 1823 by — Evans (builder): E. Blore renewed the roof 1838. The chapel restored 1854 by W. Butterfield, who renewed the ceiling; the ante-chapel restored 1868 by C. Buckeridge. The tower (the arches date 1330) over the cross ailes is very good; the panelling and pinnacles are considered to date 1433-42. The library, in plan of the form ⅂, each room measured from the extreme end being 90 feet long and 20 feet wide, was restored 1870 by Sir G. G. Scott, who likewise restored 1872 the hall; walls refaced with Taynton stone; cost £4,000. The first common room in Oxford was here fitted up 1661. The second court *c.* 1600, is 110 ft. by 100 ft. (Dallaway, *Lectures*, p. 89, supposes it is by the same architect who built the chapel of Wadham college, *i.e.* William Arnold mason, under T. Holt). The *Building Accounts* of the chapel, etc., are given in Archæological Institute *Journal*, ii, 137: Ecclesiological *Journal*, 1856, xiv, 145: B. *J.*, 1861, xix, 201.

Exeter; founded 1314; the front was 1835 Gothicised by H. J. Underwood. There are two courts. The rector's lodgings were rebuilt 1858-9 (Early Pointed) by Sir G. G. Scott, who also completed the Broad Street façade, (the eastern part of nine sets of rooms 1845 is by H. J. Underwood), with a new gateway, and a small court in connection with them. Behind them is a large house built 1612. The hall built 1618 was restored and refitted 1818 by J. Nash. Under it is a crypt known as S. Mildred's church, which formerly stood here. The chapel (Early Pointed) rebuilt 1855-69, by Sir G. G. Scott, cost £17,000: it is 90 ft. long by 30 ft. wide and 84 ft. high to the keystone of the vaulting inside (B. *J.*, xvii, 440 view; 711: int. xx, 479; xxiv, 337; xxvii, 1022. C. E. *J.*, 1859, xxii, 38 with view, and description of the works then undertaken: B. N. *J.*, 1859, v, 969, consecration; ext. 971; int. 1127). The library (Early Pointed) 1859 by Sir G. G. Scott, is 56 ft. long, 20 ft. wide and 40 ft. high (C. E. *J.*, view 1858, xxi, 275).

Oriel; founded 1326 or 1327: the court finished about 1640; on the east side is a building erected 1719; another on west side 1729; at the south end the fifteen sets of rooms date 1818. The library (Ionic) 1788 by James Wyatt, is 83 ft. long, 28 ft. wide and 28 ft. high; the common room is under it. The chapel completed 1642, improved 1677, and 1818. The hall 1637, 50 ft. long by 20 ft. wide, was improved 1826.

Queen; founded 1340, has two courts. Its whole area, 300 ft. in length and 220 ft. in breadth, is divided by the chapel and the hall. The first or south court (Doric), designed with the hall and chapel and street façade 6 Feb. 1710-59 by N. Hawksmore, though sometimes attributed to Sir C. Wren; it is 140 ft. long by 130 ft. wide, and has a lofty cloister now on two sides. The west wing was gutted by fire Dec. 1778. The north court is 130 ft. long by 90 ft. wide. The east side of the college was built 1733 at the cost of queen Caroline. The hall (Doric) is 60 ft. by 30 ft. with an arched ceiling; the south side was restored with Bath stone 1863 by W. C. Bramwell. The library, completed 1694, is 120 ft. long by 30 ft. wide; it stood upon an open cloister which was enclosed and fitted as an additional library *c.* 1845 by C. R. Cockerell. The chapel (Corinthian) 1713-19 is 100 ft. long by 30 ft. wide; the south side was renovated 1863 with Bath stone by W. C. Bramwell; the glass dates 1500, 1635, and 1717. The brass eagle is by W. Borroghes 1662.

New; founded 1375 by bishop William of Wykeham, and according to the original plan comprised a chapel, hall, library, cloisters, tower, and the gardens. The foundation stone was laid 1379 and the buildings occupied 14 April 1386. The court is 168 ft. long by 129 ft. wide. A third story was added to the other sides at the end of the sixteenth century; and the uniformity of the windows was not completed until 1675. The second or garden court 13 Feb. 1682-84, widens out by triple breaks towards the garden, where it is 130 ft. wide. The Ionic temple and the iron palisading are said to have been brought from Canons, near Edgware, *c.* 1740. The hall (original) is 78 ft. long, 35 ft. wide, and 40 ft. high before the ceiling was put up; re-roofed 1865 by Sir G. G. Scott; the curiously carved wainscoting was fixed *c.* 1530. The kitchen with its timber roof is in its original state. The library consists of two rooms 70 ft. long and 22 ft. wide; the interior fitted by J. Wyatt. Of the chapel (original), the choir is 100 ft. long, 35 ft. wide, and 65 ft. high before the roof was renewed; the ante-chapel is 80 ft. long by 36 ft. wide; the screen dates 1636; the east end was restored 1789 by J. Wyatt in plaster, by whom also the chapel was re-roofed and the seats canopied. The painted glass on the south side of the ante-chapel was originally Flemish designed, it is supposed, by some of Rubens' scholars; repaired 1740 by W. Price; those on the north side 1765-74 by Peckitt; that near the table by Egginton; the west window begun 1777 by M. Jervaise from designs by Sir J. Reynolds (engraved in 12 plates by Facius and Earlom, fol., 1785). The cloister (original) is the earliest in this university; it encloses an area 130 ft. long by 85 ft. wide, consecrated as a burial place 19 Oct. 1400. The "new buildings" to the north of a new quadrangle outside the city wall which forms one side of it, containing 38 sets of rooms, were built 1872-74 by Sir G. G. Scott, at a cost of upwards of £20,000 (B. *J.*, xxx, 829). The fine crosier nearly seven feet long of the founder, still exists. The city wall round the garden has been noticed.

Lincoln; founded 1427 and greatly augmented 1479: a large portion of its original character is preserved: six sets of rooms were built later; the front was renovated 1818. The first court is 80 ft. square: the second or south one 70 ft. square was begun *c.* 1612: in it is the chapel (Gothic), consecrated 15 Sept. 1631, 62 ft. long and 26 ft. wide; the roof and wainscot, the screen, pulpit, and eight figures are of cedar; the painted glass 1629-31 is from Flanders. The hall 1436; 42 ft. long by 25 ft. wide; was repaired and refitted 1701 with new wainscot; and again repaired 1835. The library was refitted 1739. The common room fitted up 1816.

All Souls; founded 1437. The front was 1825 restored and faced with Bath stone by D. Robertson, who continued it on the west front as far as the chapel wall. The old court is 124 ft. long by 72 ft. wide; the old library now converted into rooms occupies the greater part of the east side. The new court finished 1734, 172 ft. long and 155 ft. wide, with the two Gothic towers, are by Dr. G. Clarke and N. Hawksmore. The Chichele Codrington library 1715-56, superintended by Dr. G. Clarke and Sir N. Lloyd, is 198 ft. long, 32 ft. 6 ins. wide, and 40 ft. high; the central recess projects 18 ft. 9 in. The fittings are of wainscot, with Doric and Ionic pilasters, supporting a gallery. The law library 50 ft. long by 16 ft. wide, 1867 is by E. G. Bruton. The chapel is 70 ft. long and 30 ft. wide; the windows are painted in chiaroscuro by Lovegrove of Marlow; the west window by Egginton. The screen was designed by Sir C. Wren; other alterations *c.* 1703 are by Dr. G. Clarke; restored 1871-4 by H. Clutton (B. *J.*, xxxii, 903); the ante-chapel is of the same size. The hall, 1729, is by Dr. G. Clarke, who also designed 1703 the warden's house; and the kitchen and buttery adjoining; the latter is of an oval shape and has a fine arched roof of carved stone.

Magdalen; founded 1458 by William of Waynflete, bishop of Winchester. The first court with its cloisters was begun 1473; W. Orchyerd was "master of the masonry" 1475-80 and perhaps the designer; it is also attributed to R. Tulley, bishop of S. David's (1469-82), who laid the foundation stone; the buildings on the south side were improved *c.* 1500: its original

entrance is disused; over it is the founder's chamber. The Doric gateway was removed 1844 for a new one by A. W. Pugin. In the south-east corner of the court is a stone pulpit. On the left side are the president's lodgings 1485; altered 1769 by H. Kean or Keene, who was engaged 1756-76 at this college; and restored 1856-57 by Sir G. G. Scott. The "new building" of three stories on the north was commenced 27 Sept. 1733, after a design by Edward Holdsworth, fellow; it has a front of 300 ft. and is about 50 ft. high, having "80 windows all of the same size" (Dallaway, *Anecdotes*, 114). The two ends of the new building were designed 18... by T. Harrison of Chester, who gave general designs for the enlargement of the college. A competition for the improvement of the college buildings was opened 1823; L. N. Cottingham's restorations of the interior of the chapel were effected 1829-33; nearly the whole of the choir, with the exception of the windows, may be said to be new. The brass eagle is of the date of the edifice. The old choir stalls 1635 are now in the ante-chapel; the roof was renewed 1793 by J. Wyatt. The glass in eight windows of the choir dates 1635, and in two others before 1765 by the younger Price: the west window in chiaroscuro by C. Schwartz, was restored 1703 by Egginton, who executed those of the nave. The tower was begun 9 Aug. 1492 and completed 1508: in it are ten bells: it is 26 ft. square and 122 ft. high; (Wickes, *Church Towers*, fol., 1859, ii, pl. 12). Alterations to the library were made *c.* 1823 by J. Parkinson; and it was *c.* 1830 refitted. Chandler, *Life of Waynflete*, 8vo., Lond., 1814, p. 398-401.

The chaplain's court begun soon after 1498 was not completed until *c.* 1510. The buildings at the east end of the hall were erected 1635; those on the north side of the kitchen 1783. The hall is original; the oak wainscoting was brought from Reading abbey; the roof renewed 1793 by J. Wyatt. The choristers' school (15th cent.) 1849-51 by J. C. Buckler and Son, is 70 ft. long by 25 ft. wide, of Bladen stone with Park Spring and Box Hill dressings. The eastern building next the tower and bridge was restored before 1856 by J. C. Buckler. The *Building Accounts* of the original work are said to be in existence. (Buckler), *Observations on the Original Architecture of M. Coll.*, 8vo., Lond., 1823.

Brasenose; founded 1509, has two courts; the elaborate Gothic tower over the entrance was restored 1863 by J. C. Buckler, in Milton stone from Wychwood Forest; who also restored 1869 the south and west elevations of the college. The library, rebuilt 1780 by J. Wyatt. The chapel (Palladian) was finished 1666, but a roof of the age of Henry VII was adapted with some injury to it to this building; it was repaired *c.* 1852. There is a fine eagle in the chapel.

Corpus Christi; founded 1516. The court is 101 ft. by 80 ft; in the centre a dial was placed 1605. The fellows' building (Ionic) 1706, 119 ft. frontage, cost £6000; it is said that dean Aldrich gave the design. Several rooms on the east side were rebuilt 1737. The chapel refitted 1676; the inner chapel is 70 ft. long by 25 ft. wide; it has a good eagle; the crosier of the founder, Richard Fox, bishop of Winchester, still exists. The cloister dates 1700. The library 1517. The hall, 1517, is much altered; it is 50 ft. long by 25 ft. wide, the roof is a good specimen of late Perpendicular work.

Christ Church; founded 1525 by cardinal Wolsey: the plan is said to coincide very remarkably with that of Alcala in Spain founded 1510 by cardinal Ximenes. John Adams with other freemasons was engaged 1529 on the buildings; and Eustace Mascall or Marshall was clerk of the works or accounts for seventeen years, he died 1568. The frontage is 400 ft.; its central gateway was finished 1682 by Sir C. Wren; in it is the great bell called "Tom" 7 ft. 1 in. diam., 5 ft. 9 in. high to the crown; weight 17,000 lbs. The court is about 264 ft. long by 261 ft. wide; the north side of it erected for Dr. S. Fell, probably by — Smith, is in course of restoration by F. Bodley and T. Garner. The rooms between the hall and the canons' lodgings were rebuilt after the fire of 3 March 1809. The hall (original) 115 ft. long, 40 ft. wide, and 50 ft. high: the lobby is 65 ft. long: the approach (Gothic, and quite worthy of the 15th cent.) forming a staircase, was designed and built 1640 by — Smith for Dr. Fell; its fan tracery vaulting 80 ft. high, is supported by a single pillar in the centre of the square; new stairs, etc., lobby, and other work, 1800-1 by J. Wyatt. The common room under the hall was altered and enlarged 1871 by E. G. Bruton. The kitchen (original), a cube of 40 ft., was with the lanthorn restored, etc. 1856 by E. G. Bruton. The chapel is the cathedral, as already noticed. The second or Peckwater court (Ionic) rebuilt 1705 by dean Aldrich: the library (Corinthian), 1716-38-61, was built after a design by Dr. G. Clarke, fellow; it is 141 ft. long, 30 ft. wide, and 37 ft. high; the lower story or piazza has been enclosed for a collection of paintings. The third or Canterbury court, had the north and east sides rebuilt 1775 by J. Wyatt, the south side 1783, he also designed 1778 the Doric gateway. The new buildings on the site of Fell's buildings and the chaplain's quadrangle, were rebuilt for fifty persons (Venetian Gothic), 1862-65, by T. N. Deane, to cost £22,000; 331 ft. long by 37 ft. deep (*B. J.*, views, xx, 857; xxv, 337-46); W. C. C. Bramwell, resident architect. Crotch, Girtin, and O'Neil, *Etchings of the Ruins*, 6 pl., fol., 1809.

Trinity; founded 1554. In the first court is the chapel 1691-4 from a design (said to have been given by dean Aldrich) by Sir C. Wren, and well completed; its screen and altarpiece of cedar are by G. Gibbons. The edifice was restored 1828. The original hall was pulled down 1618 and rebuilt; and improved 1772. The library *c.* 1330 is the most ancient part of the college, having belonged to Durham college; the glass at the east end dates *c.* 1330.

St. John; founded 1557. A gateway leads from the first quadrangle to the inner court designed 1631-35 (Gothicised Italian) by Inigo Jones, for archbishop Laud, except the library on the south side; the east and west sides of it are built on an arcade, each supported by eight entire pillars of Bletchingden marble, over which are busts cast by F. Fanelli of Florence. The kitchen and chambers over the common room date 1613. The chapel, consecrated 1530, belonged to the monastery of S. Bernard; it was repaired and completed 1678; the screen (Corinthian) and altar date before 1769. The library consists of two large rooms. An ancient wood crosier, found in a garret, and 6 ft. 1 in. long is preserved, with several very fine vestments which belonged to archb. Laud. The hall was built 1530, but since improved.

Jesus; founded 1571, has a court 90 ft. long by 70 ft. wide, and another 100 ft. long by 90 ft. wide, finished 1676. New east front for the principal and fellows (15th cent.) 1854-6 by J. C. Buckler, of Box hill and Taynton stone. The chapel consecrated 28 May 1621 (revived Gothic) has a vaulted roof; restored 1856 by J. C. Buckler; the reredos by G. E. Street. The hall, repaired 1818. The library, built 1677.

Wadham; founded 1612. The first court 130 ft. square, was begun 9 April 1610 and completed 4 Sept. 1613, by T. Holt: William Arnoll or Arnold appears as the chief mason, and was paid 20s. per week; it cost about £11,360; and is built chiefly of Burford stone. A building of three stories on the south side of the front was erected 1694. The hall, 82 ft. long, 35 ft. wide, and 37 ft. high, was improved *c.* 1832 with painted glass and lofty "open timber roof, which with its louvre and oak screen are among the most remarkable in the university" (Parker, *Guide*). The chapel was new roofed 1832-3, when a stone screen was made and the stalls renovated, by E. Blore. The *Building Accounts* 1610-13 are given in the Builder *Journal*, 1850, viii, 374-5: the fine east window was erected April to Sept. 1612 by John Spicer, mason, and cost £22 10s.

Pembroke; founded 1620. The first court is small. The master's lodgings, the front, and the gateway were 1830 refaced with Bath stone and altered from the Italian to late

mediæval style, by D. Evans (builder ?) when the hall was also renovated; the new room adjoining, 1869 by C. Buckeridge; and the library over it, was fitted up 1709. The north side and the hall on the west side of a second court 1848 are by J. Hayward of Exeter.

Worcester; founded 1714; was originally Gloucester hall founded 1283. The old buildings are on the south side; the new buildings on the north side date 1759; and the provost's lodgings, are all by H. Keene. The chapel (Italian) 60 ft. long by 30 ft. wide, was restored and richly decorated 1863-70 (Renaissance) by W. Burges (B. N. *J.*, 1864, xi, 804; a view of the apse as proposed by Sir G. G. Scott, in C. E. *J.*, 1863, xxvi, 371); cost about £5,000. The hall is of the same size. The library, 100 ft. long by 30 ft. wide and 37 ft. high, with a gallery 141 ft. long, 1720-59 is by H. Keene upon a design by Dr. G. Clarke. In front and to the south are several sets of rooms built *c.* 1830.

Keble [memorial college]; (early Decorated), 25 April 1868-22 June 1870, is by W. Butterfield: it is built of red, and banded with coloured, bricks. Three sides of a court 200 ft. square are formed for 100 students: a new east side for a second court for 40 students was built 1873; the whole cost about £82,000. The chapel 1873-76 by W. Butterfield, 145 ft. long, 35 ft. wide, and 45 ft. high to the caps and 18 ft. more to the ridge, all inside dimensions, is of red brick and richly decorated inside: it is supposed to have cost £25,000 to £30,000: Church Builder *Journal*, 1876, p. 151; 1877, int. 66; ext. Illustrated London News, 26, Aug. 1876. A hall, library, and warden's house are 1877 in course of erection.

Hertford; founded as Hart hall 1487; and as Hertford college 1740; was removed to the present site 1822, as Magdalen hall founded 1602: and was reconstituted as Hertford college 1874. The principal's house and the buildings on the north-east including the library, designed 1820-22 by E. Garbett. The old hall, and chapel consecrated 25 Nov. 1716, were repaired *c.* 1830.

Of the four halls:—S. Edmund; founded 1269, was 1557 transferred to Queen's college; the chapel 1682, with the library were built for Stephen Penton, D.D. New Inn; founded 1392, a wing of the new buildings 1832 is by — Greenshields; a small chapel added 1868. S. Alban; founded 1230, the front rebuilt 1600, underwent a complete restoration and some new rooms built 1863-66 by John Gibbs. S. Mary; founded 1333 by Oriel college, and again 1616, consists of a court, having a chapel on the south side 1640; repaired 1777; restored and a stone reredos added 1871 by J. C. Buckler; the hall beneath it and of the same date was repaired *c.* 1830. Six new sets of rooms 1826, and the western front with principal's lodgings were erected and those on the north side repaired 1830-3 (Gothic) by D. Robertson.

The public buildings belonging to the University are:—The *Divinity school* 1427-80—the stone roof restored by Sir C. Wren. The *Bodleian, or public library*, occupies the south side of the schools quad., and extends over the divinity school and convocation house; the part over the divinity school was first called duke Humphrey's library, date 1566. It was erected 1610-12 by T. Holt; 129 ft. 6 ins. long by 24 ft. 6 ins. wide; the east 158 ft. 6 ins. long by 24 ft. 6 ins. wide; several other rooms round the schools quadrangle have been added for storing books. The room over the divinity school is in course of restoration (1877) by capt. Douglas Galton, and W. Jackson. The picture gallery contains many models of ancient buildings made by Fouquet of Paris. The *Public schools* were first reduced into one building 1439 by Thos. Hokenorton abbot of Oseney, 30 March 1613-19 (Jacobean) by T. Holt, of York; J. Acroid, builder; the court is 115 ft. long by 105 ft. wide; its gateway is curious as exhibiting the use of the so-called five orders of architecture (Britton, *Arch. Antiq.*, 4to., Lond., 1812, iii, 91; Gwilt, *Encyc.*) The *Arundel museum* (one of the schools), on the north side, contains the collection presented 1677 by the duke of Norfolk; the Pomfret collection 1755; and the Selden marbles. The *Sheldonian theatre* (Italian) 1664-69 by Sir C. Wren, cost nearly £15,000: 80 ft. long by 70 ft. wide, with a gallery, and will hold nearly 4000 persons; the trusses of the roof are given in B. *J.*, 1852, x, 459; it was restored and the cupola erected 1838 by Sir R. Smirke. The painted ceiling by Streater, temp. Charles II, was repaired 1762. The *anatomical theatre* 1776 in Christ Church, is now used as a lecture room by Lees reader in Chemistry. The *Clarendon buildings* (Italian), formerly the *printing office*, 1711-12 by Sir J. Vanbrugh is used for the university police and for meetings. The *University printing office* (Corinthian) 1826-27, is by D. Robertson; the east front is 252 ft. long and 39 ft. deep; the south 288 ft. long and 33 ft. wide, and contains the press room 200 ft. long and 28 ft. wide; all of Bath stone: the north front and west sides 1829-30 are by E. Blore. The *observatory* (Greek) 27 June 1772-76 by Henry Keene, was altered and completed 1778-95 by J. Wyatt; it is 175 ft. long by 57 ft. wide, and 24 ft. at each wing, the centre 88 ft. high. The *Taylor and Randolph buildings* (Greek Ionic), 1841-45 by C. R. Cockerell, which cost £50,000, contain galleries for the unrivalled collections of drawings by M. Angelo and Raffaelle (B. *J.*, iv, 505; plan and view 511; Companion to the Almanac for 1842, 202; 1844, 233). The *Ashmolean museum*, erected 1682-83 from a design by Sir C. Wren; was renovated 1863 by C. Buckeridge and arranged for a museum of antiquities, with an examination room on the third story. The *Radcliffe library* 1737-49, by J. Gibbs; cost £40,000; it is of Portland stone; is 88 ft. 6 in. diameter inside, and consisted of an open groined piazza carrying the library on the first floor, which is surmounted by a dome 48 ft. diam. and 85 ft. high inside, richly ornamented with stucco work (Gibbs, *Rad. Lib.*, fol., Lond., 1747): the piazza was enclosed 1863-64 by S. Smirke, and fitted for the reception of books. The Radcliffe collection of books has been transferred to the museum, and this building is now an adjunct of the Bodleian, the principal room being used for readers. The *Examination schools* (Jacobean) were commenced 1877 by T. G. Jackson (B. N. *J.*, 1876, xxxi, 622: which also gives J. O. Scott's design, xxix, 364, xxx, 418; xxxi, 204; and 492 that by Basil Champney).

The *Museum or Oxford University museum*, was proposed in 1854 not to exceed £30,000 (B. *J.*, xii, 388); thirty-three designs were submitted in competition (590-606), the one (free Gothic, English and Foreign) by Messrs. Deane and Woodward was selected (B. *J.*, xiii, 291; 319). The court is 128 ft. square; the metalwork of its roof was entrusted to Skidmore of Coventry; and private contributions for the carved work were sought, (B. *J.*, xiii, 559; some of the sculptured capitals are given in C. E. *J.*, 1862, xxv, 189, 225). The metal roof was removed Sept. 1858 (B. *J.*, xvi, 652), and a new one with pillars erected, cost £5000 (B. *J.*, xvi, 716; details xviii, 398-9; B. N. *J.*, iv, 1054; vi, 271, 715: a history of the building B. N. *J.*, 1858, iv, 1291; v, 29 et seq.). The laboratory 1859 and details (B. *J.*, xvii, 253; a review 335, 401). The whole edifice cost £60,000: Acland and Ruskin, *The Oxford museum*, 8vo., Lond., 1859. The Clarendon laboratory or museum of experimental philosophy, 1868-70, by T. N. Deane, 100 ft. long on the north side, 84 ft. on the west side; cost £30,000; is connected by a corridor to the museum and is attached to its north-west angle (B. *J.*, xxvii, 1023).

The public buildings of the city consist of—The Town-hall 1754 by I. Ware, 135 ft. by 31 ft. 6 in. County gaol *c.* 1810 by Geo. Moneypenny, was largely added to 1850-2 by H. W. Underwood, whose design was continued, after his death, by J. C. Buckler: the ancient crypt of S. George's church exists under one of the wings occupied by prisoners. City gaol 1786-89 by W. Blackburn. Assize courts, 1840 by J. Plowman. Corn exchange, 1861-3 by S. L. Seckham, 100 ft. long by 50 ft. wide, cost £4,000 with fittings. Baths near Magdalen

bridge, *c.* 1830; the oval cold bath is 83 ft. long and 44 ft. wide. Botanic garden 1622-33; the gateway is by N. Stone, sen.; cost upwards of £500: the porter's lodge, new library, study, and lecture room, 1835 by H. J. Underwood. The new Workhouse on the Cowley Road, 1862-3 by W. Fisher, £9000 (B. *J.*, xx, 281; 512; 767: xxiii, 82). Radcliffe infirmary 1759-70, by S. Leadbetter or H. Keene: the new buildings 1863 by W. C. Bramwell and E. G. Bruton; the chapel (Decorated) 1864-5 by A. W. Blomfield, 62 ft. long by 20 ft. wide, of Gibraltar stone with Bath stone dressings (B. *J.*, xxi, 860; xxiv, 83); new wards to north wing 1869 by C. Buckeridge. Radcliffe lunatic asylum, *c.* 1830, by — Ingleman. The Market, rebuilt 1773-4 by John Gwynn, R.A., having a colonnade now removed. Music Room for concerts, 1748, from a design of Dr. Camplin, vice-principal of S. Edmund hall, cost £1263. Gymnasium 1858 by W. Wilkinson, 85 ft. long, 45 ft. wide, and 30 ft. high, the centre part having a dome and lantern (B. *J.*, xvii, 159). University racquet courts 1870-1 by E. G. Bruton contain two courts, each 60 ft. by 30 ft., two Rugby fives courts 28 ft. by 18 ft. and single fives court 22 ft. by 14 ft. with dressing and bath rooms; cost £4000. Union club, 1858 by — Woodward is decorated with paintings (B. *J.*, xvi, 52 b); reading and writing rooms and a residence were added 1863 by W. Wilkinson. Oxford district court of probate 1863 by C. A. Buckeridge. Randolph hotel built 1864 by W. Wilkinson has about 130 rooms; cost £20,000 (B. *J.*, xxii, 298). Cowley S. John national hospital for incurables, May 1873, by C. Buckeridge. Revised by E. G. B.

Heddington or Headington quarry. Stones from the quarries at Garsington, Burford and Taynton in Whichwood forest, Stonesfield near Woodstock, and Great Barrington, are those now in use for the buildings in the city.

Wood, *Hist. and Antiq. of the Colleges and Halls*, 4to., 1786, cont. by Gutch. Loggan, *Oxonia illustrata*, fol., 1675, by Wood, 1774. W. Williams, *Oxonia depicta*, fol., 1732. The *New Oxford Guide*, 12mo., *c.* 1772-6, 6th edit. Malton, *Pict. Views of the University*, fol., Lond., 1802. Chalmers. *History of the Colleges, etc.*, 2 vols., 8vo., 1810. Pishall, *History of the City*. Ackermann, *History of Colleges*, 4to., 1814, with illustrations by Pugin, etc. Skelton, *Oxonia Antiqua restaurata*, 4to., Lond., 2nd edit., 1843. Mackenzie and Pugin, *Specimens of Gothic Arch. at Oxford*, 4to., Lond., n.d. Ingram, *Memorials*, 3 vols., 8vo., Oxf., 1837. Ollier, *Orig. views of the colleges, chapels, etc.*, fol., 1843. J. Le Keux, 101 *Views*, from drawings by F. Mackenzie, 4to. Parker, *Illustrated Handbook to Oxford*, 8vo., 1875. Eastlake, *History of the Gothic Revival*, 4to., Lond., 1872, contains notices of some of the old (p. 25), and new, works. Smith, *Ancient Carpentry*, 4to., Lond., 1787, gives some of the roofs of the colleges; and Pugin, *Examples*, 4to., Lond., 1831-6, portions of many of the buildings. The *Oxford University Almanack*, 1695-1877, each year has a large view of an edifice of the university. Moore, *Historical Handbook and Guide*, 8vo., 1871. A *Panorama of Oxford* from the roof of the Bodleian library, 4to., Lond., 1847.

Architectural progress, Building News *Journal*, 1856, ii, 889, 937, 962; and iii, 3-6, and passim; *Architectural Congress*, 1858, iv, 623-30; 668; 717. Freeman, *On the New Buildings*, 1862, in Builder *Journal*, xx, 476: and *Notice of New Buildings*, 1863, xxi, 754. Parker, *Early history of Oxford to the end of the Eleventh Century*, at the Oxford Architectural Society, 1870; abstract in B. *J.*, xxix, 270. *Meeting* of Berkshire Archæological Society at Oxford, 1873, B. *J.*, xxxiii, 814.

Amongst the edifices noticeable in the immediate neighbourhood are, Blenheim palace, the seat of the duke of Marlborough, designed 1705 by Sir John Vanbrugh, with later additions; Campbell, *Vitruvius Britannicus*, fol., Lond., 1715; Neale, *Hist. of Blenheim*, 4to., 1823; Neale, *Views of Seats*, etc., iii, 1820; Radclyffe, *The palace*, fol., 1842; Gwilt, *Encyc.*:

Iffley church, of the Norman period: the Roman villa at Northleigh; Hakewill, *Account*, 4to., Lond., 1826; and Skelton, *Oxfordshire*, 1836: the chapel of S. Bartholomew (Decorated); Cranstoun, *The Chapel, etc.*, fol., Oxf., 1844: and the Theological college at Cuddesdon near Wheatley (Early middle Pointed), 1853-54, by G. E. Street, for bishop Wilberforce.

Kennett, *Parochial Antiquities*, 4to., 1695. Skelton, *Illust. of the Antiq. of Oxfordshire*, 4to., Lond., 1823. *Guide to the Arch. Antiq. of the neighbourhood*, 8vo., Oxf., 1842-6. Ecclesiastical and Architectural Topography of England, *County of Oxford*, 8vo., Oxf., 1854 (Parker). *Gazetteer, etc. of the County; a description of the University and city of Oxford; the boroughs, seats, etc.*, 8vo., Lond., 1852. *Perambulation of Oxf.*, Blenheim, and Nuneham, etc., 12mo., Oxf., 1824.

OXFORD OCHRE. An oxide of iron. A pigment used in oil and water colour of a brownish yellow, obtained from an earth found in the neighbourhood of Oxford, and in the isle of Wight, and near Bordeaux in France; and a few other places. It is a very useful colour when properly washed and prepared.

OXICHLORIDE OF LEAD. A pigment to supersede white lead, and known as Pattinson's oxichloride of lead, the manufacture of which was established about 1852 at Newcastle-on-Tyne. The patent, enrolled 14 Aug. 1849, is described in Civil Engineer, etc., *Journal*, xii, 301; and appeared in the advertisements of the Builder *Journal*, Sept. 1852, but the manufacture was soon afterwards discontinued.

OXIDATION. The decay of a material by the action upon it of oxygen, which is the main cause of rust, and is abundant in the composition of both the atmosphere and water.

Oxidation was admitted by chemists to be the hydrate of the sesquioxide of iron containing a trace of ammonia. But by the analysis of some specimens, procured as free as possible from any source of contamination, the following results were obtained:—

Sesquioxide of iron	93·094	and	92·900
Protoxide of iron	5·810		6·177
Carbonate of iron	0·900		0·617
Silica	0·196		0·121
Ammonia	Trace		Trace
Carbonate of lime	-		0·295

As this composition is far more complicated than is usually stated in text books, the questions arise,—Is the oxidation of iron due to the direct action of the oxygen of the atmosphere, or to the decomposition of its aqueous vapour: or does the very small quantity of carbonic acid which it contains determine or intensify the oxidation of metallic iron? From experiments extending over two years, it was found that carbonic acid is the agent which determines the oxidation of iron, and it is this in the atmosphere, and not its oxygen or its aqueous vapour, which determines the oxidation of iron in common air. Some light was also thrown on the fact first published by Berzelius, namely that caustic alkalies prevent the oxidation of iron; also that 1, the carbonates and bicarbonates of the alkalies possess the same properties as their hydrates; and 2, that if an iron blade is half immersed in a solution of the above-mentioned carbonates, they exert such a preservative influence on that portion of the bar which is exposed to an atmosphere of common air (oxygen and carbonic acid) that it does not oxidise even after a period of two years. Similar results were obtained with sea water to which had been added carbonates of potash and soda: Calvert, Paper read before the Manchester Literary and Philosophical Society; printed in Building News *Journal*, xviii, 165; and 1871, xx, 116.

The causes most potent to produce decay both of wrought and cast *iron* by oxidation, are the humidity either in the air, or in running water, the chemical action being facilitated by contact with substances containing acids, and the galvanic

action produced also by contact with different materials, assisted by the presence of a fluid completing the electric circuit. Humidity in the air and in running water act by the formation of hydrous oxide in proportion to the purity of the metal. Thus wrought iron is more rapidly affected than steel, and steel than cast iron; indeed so much is the action delayed in the latter, that some authors deny its occurrence; at any rate the rust upon cast iron is principally confined to the scale surrounding it, and to the sand adhering to the surface. This is a strong reason against using thin wrought iron plates in any construction exposed to the weather—the loss, say of $\frac{1}{8}$ in. by oxidation would be immaterial in a thick casting, but would be fatal in a quarter inch wrought plate: thus it was stated in 1865 that forty tons of rust were taken out of the Menai tubular bridge at one thorough cleaning. But this supposed immunity of cast iron from oxidation is only comparative, and the cast metal must be protected from what tends to produce the coating of hydrous oxide or rust, as carefully as any other kind of iron, while if proper means are taken, they will last longer and be more efficacious. In consequence of this immunity, cast iron is generally used in positions exposed to its effects, as for pipes to be laid in the earth, metal work of lock gates, stancheons and other works in the basements of buildings sunk below the ground, etc. The amount of oxidation is increased by cast iron remaining in a state of rest; and that a mass of metal partially polished and partially rough is primarily corroded on the rough portion, was commented on by Mallet, *Oxidation of Rails*, read at the British Association, etc., at Birmingham, Sept. 1849, p. 88: printed in Civil Engineer, etc., *Journal*, xii, 341; referring to his *Second Report* on the Action of Air and Water on Iron, hereafter mentioned.

The preservation of iron from the effects of the galvanic action arising from contact with lead, or other metal, seems to be rendered easy by the zincing process described, but it is not necessary that zinc alone should be employed for the purpose, as many other substances which would present negative electricity to iron would be equally efficient. It appears that iron cast in sand is much more readily acted upon than that cast in loam; and that white cast iron is little liable to the effects of the air, whilst grey crystalline iron is more so, and that the intermediate qualities, such as the mottled irons, occupy a corresponding middle state. It would appear that the greater smoothness, and the diminished porosity of the loam castings, have a considerable influence upon the electrical action; and that the greater facility of entrance through the pores of the sand castings gives the electricity of the atmosphere greater facility of attack. It is certain that the greater smoothness of surface of the loam castings gives them a corresponding advantage in the application of a coating for the purpose of galvanization; and therefore every casting intended to be so protected ought to be run in loam. The same remark applies to castings that are to be preserved by minium and oil paints, in which process the per-oxide of lead is a substance that is almost as electro-negative as the iron underneath. Becquerel proposed to protect cannon and bullets of cast iron by immersion in still water under the influence of a protector of zinc, which would be of $\frac{1}{100}$ of the superficial contents of the bodies protected; but he requires all the castings to be run in loam. It may appear strange to require a complete immersion to get rid of the effects of humidity; but certainly the process is theoretically correct; his researches into the effects of sea water upon iron may be referred to as the last discoveries in this subject. According to this author, the state of the wrought iron exercises a still greater influence than is generally believed; but in all the experiments he records, the electro-motive force, which would constitute the measure of action, is rather greater in wrought iron of a crystalline and brittle nature, than in the soft and fibrous iron. Causes seem to be at work in the chemical action on wrought iron, as influential on the durability of the metal as the electro-chemical causes themselves; the influence of these upon the preservation of wrought iron is, however, to a great extent measured by the state of the metal. It is greater in the crystalline wrought iron; it is less in proportion as this assumes the fibrous and amorphous character usual in plate iron. Thus the old Swedish iron, and the charcoal iron, formerly used for iron railings in the metropolis, has yielded to the effects of the galvanic action of the atmosphere in a manner very different from the wrought iron made at present; which latter being made from coal, is much more fibrous in texture. Some difference in the proportions of carbon may account for the difference of action; but the case merits the attentive examination of the various effects of electro-chemistry on wrought iron. At present the best means of preventing this cause of decay appears to be the application of the best methods of painting the iron; these must always be more or less imperfect, according to the paint, whether composed of the peroxide of lead, or of the oxide of that metal. The preservative effects, however, can influence only the iron exposed to the atmosphere; for under the influence of rain, or river or sea water, these seem useless to arrest the progress of decay; the only means found in any way effectual in the case of wrought iron so exposed are, coatings of zinc, asphalte, or of coal tar. *G. R. B.

If any proof of the utter incapacity of paints, varnishes, glazings, or other mere material coatings, to grapple with corrosions and foulings be required, those who desire it have only to search over the nearly three hundred unadopted patents (1866) which have been registered as preventatives. When once malleable iron has corroded, there is no means of stopping it from corroding again but filing the work perfectly free from all the scales of rust, and immediately giving it a good coat of paint. All malleable iron whilst it is hot from the forge should be immersed in good strong boiled oil and carefully put in some dry place until it is perfectly dry: also if all castings, immediately after they were what the workmen call cleansed, had a coat of good strong boiled oil with red oxide of lead and a small portion of genuine vegetable black, or such other colour as may suit for finishing the usual three coats, there would be little fear of corrosion. All iron must be previously and carefully prepared by "pickling", which removes the scale of sand and other impurities by means of dilute sulphuric acid, before any preparation is placed upon it. The advantages and disadvantages of the application of red lead to iron is discussed in Society of Arts *Journal*, 14 May 1863; Builder *Journal*, 1859, xvii, 288; and xx, 373; 431: while the use of Dr. Angus Smith's patent application of gas-tar or asphalte, is strongly recommended for all iron work, whether exposed to the fumes of steam boilers or to the direct action of acids, although the latter must always be dangerous. The preservative effect of a zinc coating is so much greater, that it is always resorted to when it is necessary to immerse the iron in sea water. Zinc being electro-negative to iron, the decomposition which takes place very slowly tends to protect it; but it is difficult to procure pure zinc for the purpose, and great care must be taken in cleaning the surface to which it is applied; and the duration of such a protecting coat is subject to variations. It must not be exposed to the acids capable of dissolving it, as in smoky towns where sulphuric acid exists; or at the sea-side where muriatic acid exists: yet the galvanized iron in a yacht, after six years' wear, looked quite fresh. Tinned sheet iron does not now answer so well as good zinc; hence tinned baths go into pin holes in a short time: but it is much used for roofing in America. During the mediæval period, iron nail heads, anchors, dogs, and such like articles, were tinned over, no doubt to prevent oxidation. Of all the various compositions tried, oxide of copper had up to the present time been unequalled as a protector of iron from oxidation and fouling: W. J. Hay, read at Inst. of Naval Architects; given in Civil Engineer, etc., *Journal*, 1863, xxvi, 177. C. F. T. Young, *Fouling and Corrosion of Iron Ships*, 8vo., Lond., 1867,

advocates the plan of prevention put forward by T. B. Daft, C.E., as in all respects the soundest, simplest, and most practical and most certain of success.

The question of rust was most carefully considered with regard to Blackfriars Bridge, but no satisfactory result was arrived at. A plan of dipping the hot iron into a bath of prussiate of potash and chloride of potassium and further treatment with cyanide of potassium, according to Messrs. Morewood's patent, was entertained but abandoned as impracticable on so large a scale. The effect when properly carried out is to case-harden or convert the exterior surface into steel. The patent process of madame de Lavenant was tried with great promise of success, but with ultimate failure; her plan is to coat or paint the iron with a preparation of finely pulverised glass, which is then submitted to such a heat as will fuse the preparation and form an enamel surface. Ultimately the ordinary course of heating the ironwork and dipping in boiled oil was pursued, four coats of paint following; asphalte paint for the interior surfaces, and Torbay oxide of iron paint finished with Rose and co.'s olive green for the exposed face. Permanently protecting iron from rust, is now said to be done by Turner and Allen of Upper Thames Street; their process is to coat the iron with bronze or copper in such a manner as to effect perfect union between the two metals; which if it really be as perfect as stated, no doubt it will prove a most valuable discovery; Carr, *The Bridges of London*, read at Royal Institute of British Architects, 1871-72, p. 40. This last is a French process used for the lamp-posts and fountains at Paris; Messrs. Turner are the agents. A coating of lead, or of lead and antimony is wanted to iron, so as to combine the stiffness and cheapness of iron with the durability of lead. Messrs. Morewood have recently introduced iron plates covered with a uniform coating of lead [mixed with tin]. These plates are supposed to possess all the advantages of sheet lead, and can be rendered serviceable at a considerably reduced cost; Hunt, *Handbook*, 1862. An enamel without lead on bar and sheet iron by Pleische, is given in Artizan *Journal*, 4to., Lond., 1859, xvii, 70. Barff, *On the treatment of Iron for the prevention of Corrosion*, read at the Society of Arts, *Journal*, 16 Feb. 1877, p. 254-7, described that his "treatment of iron articles in common use, is to raise the temperature of those articles, in a suitable chamber say to 500° Fahr., and then pass the steam from a suitable generator into this chamber, keeping these articles for 5 to 7 hours as the case may be at that temperature of superheated steam. They will then resist the action of any amount of moisture with which they may come in contact *in* a house or building, because only a thin film of the iron is turned into the black oxide. At a temperature of 1200° Fahr., the iron surface becomes so changed that it will stand the action of water for any length of time", etc.; also printed in Builder *Journal*, p. 179-82.

When iron is immersed in *sea water*, a carburet of the metal is insensibly formed, the action of which chemists have hitherto failed to prevent. The action of *sea water upon certain metals* or alloys, is recorded by Crace Calvert, in Building News *Journal*, 1865, xii, 312. Details of *Experiments on the Corrosive action of sea water on varieties of Copper*, by Dr. Percy, with remarks by capt. James, were given at the British Association at Birmingham, Sept. 1849; and printed in Civil Engineer, etc., *Journal*, xii, 342. Mallet, *Report*, to the British Association for the Advancement of Science, *On the Action of Water and Air upon Cast and Wrought Iron*, 1838, 253; 1839, 171; 1840, 221; 1843, 1. Mallet, *On the Corrosion of Cast and Wrought Iron in Water*, a prize essay at the Institution of Civil Engineers, *Proceedings*, 1840, p. 70; and continuation 1843, p. 171-81; also in Civil Engineer, etc., *Journal*, 1840, iii, 424-6. Adie, *On the Corrosion of metals in water*, read at the same institution, *Proceedings*, 1845, iv, 323-33; also in same *journal*, 1846, viii, 371-2. Persoz, *The injurious effects of Saline solutions on forged iron, etc.*, in the "Annales de Chimie", translated with remarks by Portlock, in the *Papers* of the Corps of Royal Engineers, 1849-50, i, 406.

Fragments from the bed of the sea, of articles of iron, parts of wrecks, showing the cementitious incrustation which the metal acquires when in contact with gravel,—a natural process which might be called preservative, and is of great interest, as showing the durability of iron in similar situations. Another specimen shows the rapid decay of the same material when exposed to the alternate action of the air and sea, as by the rise and fall of tides from 1811 to 1853. The iron appears to be rapidly destroyed by the oxidation ordinarily "leaving a spongy mass of graphite or impure carbon", but has an agglutinating power while undergoing oxidation as in the bed of a river. The cramps or straps from the foundations of old Westminster bridge have been brought up, not greatly altered by oxidation or corrosion; Hunt, *Descriptive Guide* to the Museum of Practical Geology, 1860. A very important note on the decomposition of iron in connection with sand and ballast in water, is given in the *Papers, etc.*, of the Royal Engineers, 4to., Lond., iii, 177.

In iron pipes, as the soft waters contain a greater proportion of free carbonic acid than the harder ones, nodules of hydrous oxide are formed and give rise to the formation of a destructive rust. The internal oxidation of steam boilers is to be prevented by having small portions of zinc plate attached at various points inside the boilers, care being taken to secure perfect metallic contact between the zinc and iron; the same plan may be adopted with iron water-pipes; Builder *Journal*, 1857, xv, 352. Dr. Hayes, *On the Corrosion of Zinc-covered or Galvanized pipes when used for Conducting Water*, in Chemical News *Journal*, 1862, p. 188, proves that it does not answer the purpose, but produces a salt having no claim to consideration as a body forming healthy secretions. This action is partially prevented by coating the interior of iron pipes and iron tanks with a solution of lime. This action of lime on iron was expressed by C. H. Smith, at the Royal Institute of British Architects, on *Iron Floors*, Session 1853-54, p. 40: and in an article in Builder *Journal*, 1861, xxii, 318.

The action of the soil upon outside surfaces is guarded against by the application of a coating of gas-tar, or asphalte, as patented by Dr. Angus Smith. Iron heated and covered with natural asphaltum or mineral bitumen in the solid state had resisted a moist atmosphere for fifteen years; with all other materials the rust penetrated underneath; as noticed in Society of Arts *Journal*, 14 May 1863. Common iron articles, as gutters, cables, pigs' troughs, etc., are coated with gas-tar, which preparation sticks beyond endurance. Fire grates and stoves are painted with Berlin black, but this will not stand the weather. Iron roofing plates have been coated with india-rubber dissolved in linseed oil; also a sort of elastic varnish or japan; and a naphtha varnish as early as 1840. Dr. Pusher advocated (July 1871) the best varnish for protecting metals as being made of one part by weight of paraffine to three parts of petroleum; a thin film is a sufficient protection. A method of silvering cast iron articles for preservation, as practised by major Jewreinoff at S. Petersburgh, is detailed in Builder *Journal*, 1842, i, 424. Nickel plating has been much used for ornamental and useful articles, but this and silver plating is now greatly superseded by electro-plating.

Chemical action requires to be treated in a different manner. The instances, however, in which it occurs are not numerous in practice or very complicated. It arises for the most part from vapours given off by fluids or from substances connected with the iron in the building, such as the wood surrounding girders, and the stone enclosing the iron. Of the first, the most remarkable instance is the effect of steam on the ironwork of railway stations, by which the durability, especially of wrought iron, is seriously endangered, so that unless the roof of such stations can be made sufficiently lofty to ensure safety from these effects, the use of wrought iron is now nearly aban-

doned in their construction. The corrosive action of *sugar* on metals was the subject of a paper by Dr. J. H. Gladstone, read before the British Association 1853, and abstracted in Athenæum *Journal* for that year, p. 1134: and another by him at the Chemical Society, 1 May 1854.

The fir wood usually employed in connection with the iron-work of girders does not act injuriously, but oak contains gallic acid, which ultimately exercises a deleterious influence on both materials, especially when aided by the galvanic action of sea water or air. Iron nails used in wood ships are a cause of decay, as stated by Kuhlman; the iron yielding a portion of its oxygen to the wood, etc.: Builder *Journal*, 1860, xviii, 47. Copper nails do not produce this effect. Lead, it has also been presumed, is affected by the gallic acid of oak, and is itself deteriorated by the process for the extraction of the silver.

The effect of *stone upon iron* depends perhaps more on the humidity that may be contained in it, but the swelling and rusting of wrought iron cramps in contact with certain salts of lime demands careful attention. Among the recorded examples of this action upon cramps, are two noticed at the Literary, etc. Society of Manchester, 19 April 1859; and printed in Builder *Journal*, xvii, 348; also Artizan *Journal*, xvii, 151. The dilapidated state of the upper angles of king Henry VII's tomb, in Builder *Journal*, 1869, xxvii, 789. The steeple of Bow church, London, as in the article Gwilt herein, who rebuilt the spire. The masonry of the Horse Guards, and of the Banqueting House, in Whitehall, is shattered by the expansion of the cramps. In Wren, *Parentalia*, it is stated that "in taking out iron cramps and ties from stonework at least four hundred years old, which were so imbedded in mortar that all air was perfectly excluded, the iron appeared as fresh as from the forge". In setting iron in stone, Portland cement has been recommended to be used in lieu of lead, taking care to make a regular cavity round the iron to receive the cement: Builder *Journal*, 1852, x. A tamping of sulphur has been practised of late years for cramps, with an ultimate disadvantage to the stone and iron; Gatehouse, in the same *Journal*, 2 Sept. 1876. Iron enclosed in lead for 90 years had the bloom unimpaired; also iron hooping 26 years bedded in cement was as blue as when first covered; both of these are considered perfect preventitives of corrosion; Inst. of Civil Engineers, *Proceedings*, 1839, i, 33, 37. Cramps of iron are now usually in good works enclosed in copper.

Glazing and enamelling of iron was patented 1846 by Kenrick of West Bromwich; Civil Engineer, etc., *Journal*, 1847, x, 27. At the Exposition at Paris 1849 were numerous iron articles covered with a sort of transparent vitreous coating: same *Journal*, x, 71; perhaps the method of —Paris, reported on to the Society of Arts at Paris by — Ebelman; same *Journal*, x, 272; which xiii, 231, describes a patent for a glaze to be fused or not. B. Baugh 1865 introduced into London the enamelling of iron goods; as tubes for gas or water; for grate fronts; in roofs, rendering painting needless; name plates for railway stations, streets, etc.; and considered that it will withstand the atmospheric effects deteriorating other materials; Building News *Journal*, 1866, xiii, 11. By the patent glass enamel company of Birmingham, articles are thus treated for sanitary purposes, as substitutes for leaden tubes in breweries, distilleries, waterworks, etc.

Zinc is oxidised to the extent of 130 grains per square foot in twenty-seven years, nearly one-half of the oxide thus formed being removed by the moisture of the atmosphere; Pettenhoffer, in Artizan *Journal*, xvi, 97. Gold, aluminium, and nickel or German silver, do not oxidise by contact of air, while silver does oxidise, and advantage is taken of it to form a contrast in ornamental silversmith's work.

Anticorrosion. Atmospheric influence on Building materials (p. 123). Bronze. Carbon. Copper. Chemistry of Building materials. Decay. Decomposition. Eremacausis. Galvanic action. Galvanized iron. Glass. Hydrogen. Iron paint. Lead (p. 49). Limewater. Litharge. Muntz's metal. Portland Cement. Preservation. Red Lead. Rust. Sugar. Sulphur. Verdegris or Verdigrease. Water, Sea and Fresh. Weathering. White Lead. Zinc.

OXIDE OF COPPER; see Oxidation.

OXIDE OF IRON. This metallic oxide gives usually to glass a green colour; but by various methods of treatment, M. Bontemps was able to obtain all the colours of a spectrum; British Association, etc., at Birmingham, Sept. 1849; printed in Civil Engineer, etc., *Journal*, xii, 343. It is also a valuable ingredient in hardening cementitious material, but it is a very expensive one.

OXIDE OF IRON paint. Wolston's Torbay iron paints are noticed s. v. Iron paint. "Warton native oxide of iron" is noticed "as superior to any other paint in body and brilliancy of colour; and unlike lead pigments, is innocuous to the workmen using it"; manufactory at Manchester. Oxidation. Longmaid's patent (1849) for treating the oxides of iron for obtaining a black or dark-coloured pigment, or a volatile oleaginous product, or an inflammable gas, is described in Civil Engineer, etc., *Journal*, xii, 179. Oxford Ochre.

OXIDE OF LEAD; see Red Lead.

OXIDE OF ZINC. A useful vehicle with which to colour iron flue pipes, or hot water-pipes, inside a building. Mixed with water, any of the ordinary colours in powder may be added as required to match the colour of the walls, but no oil or turpentine should be used or the colour will fly.

OXIGONIUM, see Ox-eye moulding and Ox-eyed arch.

OXLEYA xanthoxyla, one of the genera of Cedrelaceæ, a native of New Holland, where it attains the height of 100 ft. The wood is yellow in colour, whence it is called "yellow wood", and is employed for building boats. 14.

OX-SHED (Lat. *Bubile* or *Bovile stabulum*; Fr. *bouverie*), see Cattle-shed.

OXYBAPHON. A Greek term applied to a bell-shaped vase having a plain foot and a moulded rim, and with handles, chiefly found in Magna Græcia; Fairholt, *Terms in Art*, gives an illustration of one.

OXYCEDRUS, see Juniperus.

OXYGEN. A component part of the atmosphere and one of the most abundant and important of the elements. It forms nearly one-fourth part of common air and eight-ninths of water. About one-half the weight of silica, limestone, and clay, the three most common of the solid materials of the earth's crust, consist of the same element. It is also an important constituent of all animal and vegetable substances. In all the substances mentioned above except air, oxygen is present in chemical combination with other elements, and though occasionally set free and liable to enter into new combinations, these changes requiring the application of heat or acids are of comparatively little interest to the architect. Certain combinations of oxygen with iron and other metals, are, however, important as the sources of colour in various constructive materials liable to be further changed by oxidation.

Every hundred parts of pure dry air consist of

	By weight.	Volumes.
Oxygen gas	·23	·21
Nitrogen gas	·77	·79

In the atmosphere the oxygen and nitrogen are mixed, not chemically combined. Each is capable of parting from the other and entering into combination with any element present with which it has affinity. The two, always in the same proportion (one part of oxygen to four of nitrogen nearly), form a mixture everywhere present, and having the power of absorbing and retaining in suspension almost everything that exists in the gaseous form. Carbonic acid gas, carburetted hydrogen, ammonia, and the vapour of water are always present. Sulphurous acid is never absent in the air of towns where coal is

burnt, and there must always be, besides these, an infinity of organic and inorganic particles recognised by the sense of smell in many cases, but quite inappreciable by the most refined processes of modern chemistry. A peculiar condition of oxygen called "ozone" must also be mentioned as affecting the condition of the atmosphere. The quantity of carbonic acid in the atmosphere is about four parts in ten thousand; the ammonia is too small for accurate measurement; the vapour of water capable of being held in transparent air varies with the temperature, and is subject to constant change, the quantity actually held at any given time and place varying very greatly.

The chemical effect produced by oxygen on exposed surfaces of constructive material is owing to the aqueous vapour contained in it, and the sulphurous acid and foreign substances held in suspension by the mixed gases which form the atmosphere. Changes from heat to cold inducing expansion and contraction, together with the mechanical action of rain and drip, all assist in that disintegration and decomposition of absorbent stones known as WEATHERING. Artificial stones in which carbonate of lime is present, cements and mortar, are also subject to this process, which is sometimes checked when it has advanced a certain length, but in other cases it continues till it has destroyed the stone or eaten away the cement. No chemical action would take place by the exposure of stone or cement to perfectly dry air. The presence of vapour is essential to weathering, and the frequent recurrence of changes of temperature, combined with a large amount of moisture in the air, must be regarded as the condition most liable to bring on rapid destruction by weathering.

Oxidation and weathering are more destructive and more rapid in proportion as stones are more absorbent; whether uniformly so, as in chalk and some sandstones, or in parts, such as is usually the case in the planes of bedding or of cleavage. When a rock contains in large proportion, or consists of, uncrystallised carbonate of lime in alternating bands with intervals more or less soft, and especially where the partings are rotten and the stones are placed in a building without strict regard to the natural bedding, however obscure that may be, it is certain that the action of a few winters will be visible on the surface of building stone of this kind, and lay bare the weak places. Decay will then commence and go on at a rapidly increasing pace. Oil paint is only a temporary check to the process of oxidation, which must end in destroying the surface of an exposed face of limestone or of sandstone cemented with calcareous particles. A damp atmosphere aided by driving rain, especially with a south-westerly exposure, must always in the climate of England act very unfavourably on an exposed face of stone. The coating of soot that is soon accumulated on the surface of stones in smoky towns is sometimes a preservative, though very unsightly; but occasionally it helps rather than checks weathering: while, on the other hand, while the intrusion of the roots of plants frequently produces fissures in stone, a thin coating of vegetable growth often seems to enable a fairly good stone to bear exposure with better results. A hardening of the surface is often effected by exposing stone when worked to its shape to the ordinary action of weather, before removing it from the quarry.

Of the English building stones, the well compacted sandstones, the compact Portland limestones, the semi-crystalline magnesian limestones, and the carboniferous limestone, as well as some others, resist weathering for a long time. Many of the red sandstones, the common varieties of soft limestone, and some other kinds often used, absorb rapidly the moisture of the air or the water of rain, admit into the interior of the block, by capillary attraction, the acids and alkaline salts commonly found in the air of towns, and soon lose their exposed and most chiselled surfaces and angles, and after a time rapidly disintegrate.

The effect of oxidation in converting many pale yellowish greenish or pinkish stones containing iron into darker red, is well known and very common. This change does not greatly affect the soundness of the stone, and is not strictly weathering. In some cases, however, the iron oxide has served as a cementing medium, and the new compound is much less secure a cement than the former one. The action of the oxygen of the air, if slow, is incessant, and must sooner or later prevail. OXIDATION. D. T. A.

OXYGEN GAS; see GAS (NOXIOUS).

OXYRHYNCHUS, now *Beknesa*. A stately and populous city of lower Egypt, the seat of Christian orthodoxy, with twelve churches: a number of mounds now mark the site of a large town. The inhabitants worshipped a small fish in a magnificent temple, which gave rise to this Greek name for it, from the form of its pointed nose. RUFIN. c. 5, in Vit. Patrum, p. 459. STRABO, l. 17, p. 1166. AMMIANUS, 22, 16. GIBBON, *Decline, etc.*, ch. xxxvii. WILKINSON, *Modern Egypt, etc.*, 8vo., Lond., 1843, ii, 23; and *Ancient Egyptians*, 8vo., Lond., 1837-46, v, 249. 96. 28.

OY and OYEN (S. VAN), or D'OYA (S.), see NOY (S. VAN).

OYELET, OYLET, OILET, and EYELET. Small circles inserted in the tracery heads of windows, in the Decorated and Perpendicular periods, to fill up interstices; they generally contain trefoils, or quatrefoils. In early Decorated work, the window heads are often composed entirely of oyelets, touching each other, as in the lower windows of the west front of York Minster. LIGHT. LOOPHOLE.

OYELET is "commonly applied to the small windows or crossed loops in mediæval fortifications, but upon no distinct authority that I am aware of," as stated in WILLIS, *Nomenclature*, 4to., Cambridge, 1844, p. 52. In the *Accounts* of S. Stephen's chapel, Westminster, is "40 pieces of Caen stone for oylets"; SMITH, *Westm.*, 4to., Lond., 1807, p. 207, 209.

OYLEMENT. A term which occurs in the specification for the windows in the Beauchamp chapel, Warwick; and is considered by WILLIS, *Arch. Nomen.*, 4to., Cambridge, 1844, p. 51-2, to apply to the small *trefoil* opening in the head; as *Katurs* applied to the *quatrefoil* openings. 16.

OYSTER SHELL; see SHELL.

OZIERI, or OTHIERI. A town in the island of Sardinia. The houses are good and built of dark limestone, in narrow winding streets: at one end of the principal street is a monumental fountain from which a watercourse traverses it. It is the see of a bishop removed from Bisarcio. The cathedral offers nothing remarkable; it has a baptistry: there are several churches, of which that of the Madonna di Loreto is the best; a seminary; two convents; several schools; a court house, a town house, a casino; and a prison. Outside the town is the chapel of the Madonna di Monserrato. Eight miles distant is BISARCHIO, or Bisarcio, a mediæval town and said to be an abandoned see; the cathedral was dedicated to the Conception of the Virgin Mary, and perhaps also to S. Antioco, a church of which name dates from 1153. Four miles further are the mediæval walls of the city of ARDARA, with a church dedicated to the Madonna del Regno dating in the eleventh century; it is 90 ft. long by 30 ft. and has a nave and ailes. 28. 50. 96.

THE

DICTIONARY OF ARCHITECTURE.

P TRAP; see D TRAP.

PABEHAM (JOHN DE), was a *socius* or partner with the architect John de Bello or de la Bataille, *cementarius*, during the erection 1291-4 of the queen Eleanor Cross at Northampton; *Archæologia*, 4to., Lond., 1842, xxix, 182.

PACANELLI (D.); see PAGANELLI (D.).

PACASSI (N.); see PAKASSY (N.)

PACCARD (ALEXIS), born 19 Jan. 1813 at Paris, was a pupil of Huyot, and entering the école des beaux arts at the age of 17, was awarded in 1841 the grand prix in architecture and the departmental prize. He went to Rome, and the last design he sent was a *Restauration polychrome du Parthenon*, for which he received at the Universal Exhibition in 1855 a large gold medal of the second class. On his return to Paris he was made an inspector of the works of the State. In 1853, whilst at the Tuileries under Visconti, he was appointed architect to the château de Rambouillet, and shortly afterwards to the château de Fontainebleau in place of H. C. Lefuel, who had been made architect to the Louvre. His principal works there, are:—the alteration of the galerie de Diane into a library; the restoration of the chapel of S. Saturnin or of the Trinity, into which he introduced the woodwork of the reign of Louis XIII which had been stowed in the garrets; the restoration of the apartments of king Louis XIII; the building and design of the galerie des Fastes; the monumental staircase of the pavillon Gabriel; the restoration of the façades of the cour Ovale, and of the galerie des Cerfs; the staircase called that of Philippe Auguste, etc. Besides these he restored the tower of Gaston Phébus at the palace at Pau; and the mortuary chapel containing the remains of several members of the Bonaparte family at Ajaccio, for which work he was made a chevalier of the Legion of Honour. In 1863, on the reorganisation of the école des beaux arts at Paris, he was appointed a director of one of the *ateliers* of architecture. In 1867 one of his pupils obtained the first prize for architecture, and two others the first and the second mention. With L. E. S. J. de LABORDE, he published *Le Parthénon: Documents inédits servir à une Restauration*, fol., Paris, 1848; and 1854; no text. He died 18 August 1867. BELIER, *Notice*. GUILLAUME, *Discour*. LANCE, *Dict. Biog.*, 8vo., Paris, 1872.

PACCHACAMAC, now LURIN near LIMA in South America; the temples of which were destroyed 1534 by Pizarro.

PACCHIONE (.....), a pupil of the sculptor Clementi, and also a sculptor, completed the erection of the church of the Madonna della Ghiara at Reggio, designed 1597 by A. Balbi, and added the vaulting of the cupola. 28.

PACCIOTTO (Conte .....), called Pachote by SIGÜENZA, was a native of Italy, being of the family of Rafaello Sanzio. He was recommended as an architect 10 April 1551 by Anibal Caro to the duke of Parma; *Raccolta di Lettere sulla Pitture, etc., dal secolo* XV *al* XVII, 3 vols., 4to., Rome, 1754; also 6 vols., Rome, 1757-66, ii. He then served as military engineer to king Philip II of Spain; who, writing from Segovia 1562 to the duke of Alcala, viceroy of Naples, stated that in having to send Pacciotto to that kingdom, he had charged him among other things to inspect the towns and their fortifications, and to report on their condition. He built 1568 for the duke of Alva, the citadel at Antwerp in the form of a regular pentagon. His design was selected by Philip II from amongst others sent from Italy 1573 for the enlargement of the Escurial, but as it was almost a copy of the Vatican, Herrera, the resident architect, made considerable alterations to render it suitable for the purpose, from whose design a large model was made. Pacciotto was appointed chief engineer of the Spanish army in Flanders, and died in the assault on the castle of Cales, April 1596. A brother succeeded him as architect and engineer. 66.

PACE (Latin *passus*). A measure of length of uncertain extent; supposed to be a quantity measured by the foot in walking from the original place where it is taken up to that where it is set down: this was double the GRADUS, which was the distance from one foot to another in a step. 14.

Ancient Rome	= 58·219 English inches (GWILT, *Encyc.*, *Gloss.*, s. v. Aqueduct)
	= 4·84 Engl. ft., or 58·1 Engl. ins.
	and = 5 Roman ft. of 11·62 (between 11·60 and 11·64) Engl. ins. PENNY CYC. s. v. mile.
1000 or mille passus	= the Roman mile = about 1614 yards Engl.
Ancient Greece	= 4½ Olympic ft., or nearly 4½ Engl. ft.
English	= 1⅝ yards = 5 ft. GWILT, *Encyc.*, *Gloss.*, s.v. Measure, and 1224: PENNY CYC., s.v. league of XIV cent.
,, 1000	= 1 mile
,, once used	= upwards of 69in.
Military pace	= 30 inches; in double time 36 ins. In slow time 75 paces are taken in a minute; 110 in quick time; 150 in double time.
Geometrical pace	= 5 feet.
Common pace or step	= 22 French ins. D'ANVILLE, *Mesures Itinéraires*, p. 7-8.
Passus dexter or ecclesiasticus	= English yard; DUCANGE, s.v. Dextri.

PACE. A broad step or slightly raised space about a tomb; as in the contract for the tomb of Richard earl of Warwick, which was to have a pace 6 ins. thick and 18 ins. broad. FOOTPACE, ESTRADE, and LANDING. 19.

PACE. This term, probably meaning the nave, is used in the sense of "a church of one pace", as applied to that at Cantley, and at Armthorpe, co. York, in HUNTER, *South Yorkshire*, fol., Lond., 1828-31, i, 84; 89.

PACENHAM (THOMAS DE), see PATENHAM (T. DE).

PACH. The name used in Hindustan for a pillar, such as is

shown in KITTOE, *Indian Architecture*, fol., Calcutta, 1838, pl. 20.

PACHEROT (GERAULME or JERONYME). An Italian mason and stone-cutter, was employed 1506-8 on the fountain, and certain marbles and pillars, at the château de Gaillon. He died at Amboise. DEVILLE, *Comptes des Expenses*, 4to., Paris, 1850.

PACIOTTO, see PACCIOTTO.

PACKAGE. A large parcel, comprising a number of small articles. The weights of a large number of "packages", compiled by major Harry D. Jones, is given in the *Papers* of the corps of Royal Engineers, 4to., Lond., 1832, iii, 192: reprinted in GWILT, *Encycl.*, edit. 1876, p. 1342-3.

PACKH (H.), nephew of P. von Kuehnel or Khünel resumed the works 1828 at the dom kirche at Gran in Hungary, following his uncle's design. The cathedral was inaugurated Sept. 1856. GRAN and KUEHNEL.

PACKING. In masonry, the small stones and chippings used with mortar to fill in the spaces between stones in the body of a wall. The packings and forms of the joints, valves, and buckets of pumps, are described in BUILDING NEWS *Journal*, 1864, xi, 609-10.

PACKING BOARD. The term applied to the boards used with poling boards over the intended soffit of an arch in tunneling, to the top of the heading wherever the earth shows symptoms of falling in.

PACKING CASE. A box, generally made in England of common deals, and in other countries of the wood ordinarily used. For protecting and keeping together objects during transit, it is made of rough construction; but for transit across seas it is generally lined with tin or zinc, and soldered up to be watertight and exclude moisture. As a rule these cases are sold after having done the special duty, and are then cut up for firewood or reduced to smaller sizes. RICHARDSON, *Packing Case Tables, showing the number of superficial feet in boxes or packing cases from six inches square and upwards*, 4to., Lond., 1864.

PACK-SADDLE ROOF, usually called SADDLE ROOF. A tower with two gables at back of each other, as at Brookthorpe, and Versainville; given in GLOSSARY, pl. 211. 17.

PADDOCK or PARROCK. A field adjoining to, or surrounding a house; a diminutive of park: *Archæologia*, 4to., Lond., 1814, xvii, 154. The field is always of grass.

PADERBORN. A town in the province of Westphalia in Prussia, situated at the source of the river Pader. The wall has five gates. The town is full of picturesque old houses. The Roman Catholic cathedral, dedicated to S. Liborio, was founded by Charlemagne 717, burnt 1000, was rebuilt and completed 1015, of which date is also the crypt. The present structure was built 1143, and has alterations of the three succeeding centuries. The plain and tall west tower (early 11th cent.) has no door, but a wheel window, over which are six rows of small windows; the steeple was destroyed by lightning. The church with transepts is 345 ft. long and 66 ft. high. It contains three brasses, 1341-80-91. The south entrance is given in MOLLER, *Denkmäler*, fol., Leipzig, 1821, pl. 17, who notices that the small canopies over the statues, and shaped like little towers, occur for the first time. There are four other churches and a Protestant one. To the north of the cathedral is the chapel of S. Bartholomew (Romanesque) erected 1020 for bishop Meinwerk by Greek workmen; LANGE, *Original Ansichten*, fol., Darmstadt, 1843, gives an interior view. The town house, 1615, has a mixture of styles; the university founded 1623 was abolished 1819; there are also two monasteries, a nunnery, law courts and public offices. The little seminary *cir.* 1866, by — Guldenpfennig, is given in BUILDER *Journal*, 1873, xxxi, 386. BRAND, *Dom. zu P.*, 8vo., 1827: SCHIMMEL, *Westphalens Denkmäler*; GRUEBER, *Die Christlich. Mittelalterlich Baukunst*, ii, p. 16; LUBKE, *Mittelalt. Kunst in Westphalen*, fol. 14. 28. 50. 96.

PADERNO (ANTONINO DA), with other engineers, conferred in 1399 with Jean Mignot, on certain works at Milan cathedral. MIGNOT. 27.

PADLOCK; see LOCK, p. 117. This fastening was 1540 invented at Nuremburg by M. Becker.

PADOVA (Lat. *Patavium*; Engl. *Padua*; Fr. *Padoue*). The capital of the province of the same name in Northern Italy, situated on two branches of the river Bacchiglione over which are numerous small bridges. It is surrounded by a lofty wall, flanked with bastions, two of which, including that of Cornaro 1534, were by M. San Michele; and is entered by seven gates, of which the following are the best—*porta* del portello 1518 (Composite) by G. di Bergamo; *porta* S. Giovanni 1528 (Corinthian); and porta Savonarola 1530 (Composite), are by G. M. Falconetto. Padua is perhaps the oldest city in the North of Italy. Little remains of the amphitheatre; and of a temple; ZABARELLA, *Gli Aronzii, Marmi antichi*, 4to., Pad., 1655; NOALE, *Dell' antichissimo Tempio scoperto anni* 1812-19, 8vo., Pad., 1827. An antique sarcophagus discovered 1274 now stands in front of the palace of the Delegazione Provinciale, beneath a canopy of brick. The ancient column in the piazza dei Signori was discovered in the eighteenth century. The triumphal arch erected 1632 in honour of Alvise Valaresso, captain of Padua, was designed by Giambattista della Scala. The prato della Valle or piazza delle Statue or Vittoria Emanuale contains about 80 statues of the great men of Padua and of other places: the embellishments were designed *cir.* 1775 by don D. Cerati. In the piazza of S. Antonio is the sepulchre of Rolando Piazzola (*temp.* emperor Henry VII, 1309-14) under a Gothic canopy; and the equestrian statue of Gatta Melata, whose real name was Erasmo da Narni, by Donatello.

The duomo, dedicated to the Assumption of the Virgin Mary (Romanesque pointed, and of brick) is said to have been commenced 1123 by Macilo, according to an inscription on one of the caps of the columns (LALANDE); rebuilt in the fourteenth century by Macolo (MILIZIA s. v. B. Squarcino); renewed or rebuilt 1524 by J. (Tatti) Sansovino in the Composite order; and altered by Almerico; in 1754-56 B. Squarcino completed the structure, by adding the cupola, which is also said to be due 1756 to G. Gloria. The choir and sacristy 1552-70 are attributed to M. A. Buonarroti. The façade has never been commenced. The present altar 1762 is by the sculptor F. Androsi. There is a subterranean church. DONDI OROLOGIO, *Lettere due sopra le fabbriche delle Cat.*, 4to., Pad., 1794. The baptistery, dedicated to S. Giovanni Battista (Lombard), is of the (11th, 12th or) 13th century; it is square on plan surmounted by a dome (HOPE, pl. 8), and has a distinct chancel (ECCLESIOLOGIST, *Journal*, iv, 11), also called "a low projection", etc., by WEBB: (RUNGE, *Backstein-Architektur Italiens*, fol., Berlin, 1846-53, pl. 42). The inside frescoes were by Giovanni and Antonio of Padua; those on the outside have disappeared. S. Agostino (also SS. Filippo and Giacomo) degli Eremitani (Lombard), the chapel of the university, was erected 1264-76 (1226 TSCHISCHKA); and roofed 1308 by fra Giovanni, said to be the one he removed from the town hall. The church and cemetery were consecrated 1435; the former consists of a single nave of great width and 300 ft. long, lighted chiefly from the west end, and having a plain coved panelled timber roof, of a peculiar arrangement with collars or ties (a sketch of which is given in WEBB). The floor is of variegated marbles. The frescoes are by A. Mantegna. The monument to the architect (which one is not stated in the *Handbook*) of the church, in the right hand transept, is an odd half-length statue clad in a robe. That to Benavides 1583 is by B. Ammanato. PIGNORIA gives cuts of the bas-reliefs of 14th and 15th cents. near the altar.

The basilica of Sant' Antonio or il Santo (Byzantine with some features of S. Marco at Venice) was erected 1231 or 1255-1307 by N. da Pisa. It is 326 ft. Engl. (280 ft. Paduan) long, 160 (138 ft.) wide through the transepts of a Latin cross, and 128 ft. high (110 ft.) internally in the domes, of which there are eight, the one over the choir was added 1424. Round arches divide the nave from the chapels: the interior is richly decorated. Great part of the east end was damaged by fire 28

March 1749. The west front 128 ft. long and 93 ft. high has been entirely renewed of late years; the fresco over the lunette was painted 1452 by A. Mantegna; HOPE, pl. 67; and CHAPUY, *Moyen Age Mont.*, fol., Paris, 1840-2, pl. 62 or 73, give the façade, and the latter the cloister also; CICOGNARA, *Scultura*, fol., Venice, 1813, i, pl. 1. Extensive repairs were being carried out 1858. One of the two octangular campanili beyond the transepts is described in *Detached Essay*, Campanile, p. 4, and *Illustrations*, s. v. Brickwork. The marble altar (15th cent.) raised on seven steps, is given in GAILHABAUD, *L'Arch.*, 4to., Paris, 1858, iv. The bronze doors of the choir and shrine are described s. v. Door (metal): the stalls *cir.* 1400 are shewn in *Illustrations*, s. v. Ecclesiastical sculpture, pl. 93. The enriched marble chapel of "il Santo", begun 1500 by Giovanni Minello and Antonio his son, is said to have been continued by Sansovino, but a contract dated 28 Jan. 1533 (not 1553) would show that it was nearly all the work of G. M. Falconetto. Antonio, Tullio, and Giulio Lombardo, sculptors, were employed: two bas-reliefs are given in CICOGNARA, ii. The chapel of the Madonna Mora (Gothic) was part of the church of Sta. Maria Maggiore, built 1110, and nearly all pulled down for the present edifice. The chapel (originally dedicated to S. Giacomo, but to S. Felice since 1504) is 1376 by Andriolo Taiapetra of Venice (GUALANDI, vi series, Bologna, 1846); it has a range of Gothic arches in red Veronese marble: the chapel of S. Antonio, XIV cent., is given in *Le Moyen Age Mon.*, pl. 8. The great bronze candelabrum or Paschal candlestick by A. Riccio 1564, the work of ten years, is given in CICOGNARA, *Storia della Scultura*, fol., Venice, 1813-18, ii, pl. 35, 36: and ii, pl. 12, shows two of the sculptures of the doors in the capella maggiore; and also the sculpture of the altar of the capella della Mantegna agli Eremitani. PERISSUTTI, *Notizie—all' insigne basilica di S. Ant.*, Pad., 1796. BURMANN, *Thes. Antiq. Ital.*, iii, iv, v. BIGONI, *Il forestiero, etc., nelle basilica di S. Ant.*, 16mo., Pad., 1816; 1823. GALLY KNIGHT, *Eccles. Antiq.*, fol., Lond., 1842-44, ii. N. SHAW, *Architectural Sketches*, fol., Lond., 1858, pl. 59, which is also given in BUILDER *Journal*, xvi, 647.

Sta. Giustina (Italian), chiefly of marble, is usually said to have been commenced 1502 by fra G. da Brescia, but his design being found full of errors, one, 1515 by S. da Lugano was adopted, but found too expensive; and a third was prepared by A. Briosco called Ricci, which was begun 1521, continued by A. Morone with A. Leopardo 1532-49; or by A. Ricci and A. Leopardo, by others. The nave is 182 ft. (Paduan ?) long, 35 ft. (or 42 ft.) wide, and 82 ft. high; the ailes 19 ft. (22 ft.) wide, and 41 ft. high; the transept is 252 ft. long, 39 ft. wide, and 82 ft. high; the piers of the nave are 12 ft. square; the whole width of nave and ailes is 97 ft.; the chapels are 30 ft. long, 20 ft. wide, and 40 ft. high; the length internally is 290 ft.; the whole length is 367 ft., and 133 ft. high at the centre cupola (WOODS, *Letters*). There are five domes, and two others to the transepts, from which the church is lighted. The façade is not completed. The pavement is of red and white marble mosaics. The wood-work of the choir was designed 1556 by A. Campagnola; the *stalls* of the *coro vecchio*, the only portion of the older church preserved, date from a century earlier, and are by two artists of Parma and Piacenza; AICARD, *Patria*, 8vo., Paris, 1847, p. 2148, states they were sculptured by Richard Taurigny of Rouen. A plan of the church is given in LECLERE, *Recueil*, fol., Paris, 1826, pl. 44. Beneath the chapel of the Virgin are two ancient cells called the prison of Sta. Giustina. A fine cloister is annexed to this church; the large cloister is part of the older monastery; the one painted by il Zelotti was designed by P. Lombardo, *cir.* 1470-80. It is now a barrack. CAMPAGNOLA, *Il claustro di S. Gius., del. da F. Rengardi*, fol.: and *Pilastermalereien*, 11 pl., fol., Berlin, 1876. *Descrizione delle cose più notabile che sono nella chiese di S. Giust.*, 12mo., Pad., 1741; 1759, 5th edit. FEDERICI, *Diss. Storica della biblioteca di Sta. Gius.*, 1815.

Sta. Maria dell' Annunciata, usually called dell' Arena, and Giotto's chapel (plain Gothic), was designed 1303-10 by A. Bordone, called Giotto, and decorated with paintings by his own hand, hence it is noticed as an example of unity of design. It is built of brick, and consists of a nave 68 ft. 4 in. long, 27 ft. 8 ins. wide, and 39 ft. 4 in. high to the apex of its semicircular vault; the tribune, 27 ft. 3 ins. long, and 14 ft. 5 ins. wide, is groined; a north sacristy is 15 ft. 7 ins. square. The monastery is destroyed. The lancet-shaped windows of the chapel mostly retain the ancient Venetian glazing comprised of small circular panes of thick glass. The wooden door is covered with cut-iron plates. The pulpit, a perfect specimen of the late AMBO, is given in *Illustrations*, s. v. Pulpit, pl. 94. The building was restored 1770 and 1837. A plan and section in ALLGEMEINE BAUZEITUNG, fol., Vienna, 1847, pl. 90. The frescoes are described in the *Handbook;* by NORTON, in BUILDING NEWS *Journal*, 1858, iv, 217; and by AUDSLEY, 1869, xvii, 502. SELVATICO, *Sulla capellina degli Scrovegni nell' Arena, e sui freschi*, 20 pl., 8vo., Pad., 1836. CALLCOTT, *Description of the Annunziata dell' Arena*, 12 pl., etc., fol., Lond., 1835. RUSKIN, *Giotto and his works in Padua*, 3 parts, cuts, 8vo., Lond., 1854. A coloured view of the interior as supposed to exist in 1306, by Mrs. H. Burr, was published by the ARUNDEL SOCIETY, fol., Lond., 1856.

The following of the remaining churches are noticeable:— Il Carmine (modern Italian) has only a nave with a barrel vault, six recessed chapels on each side, and semicircular clearstory windows with small vaults intersecting the great vault. S. Clemente (Italian) 1785. S. Filippo, an oratory. S. Francesco, designed by Sansovino, has a long low chancel. S. Gaetano has a façade by Scamozzi. S. Giorgio, 1377, was erected as the sepulchral chapel of Raimondo di Soragna; the frescoes are by Avanzi. S. Giovanni, Sta. Lucia, and Sta. Rennato, are attributed to A. Palladio, as also Sta. Rosa *cir.* 1756, which is by G. Gloria. Sta. Maria in Vanzo, 16th cent., has some fine paintings. S. Michele, part of a demolished church converted into an oratory, is full of good frescoes. Madonna della Grazie of the Dominicans, is by G. M. Falconetto. Sta. Sofia is supposed to be the ancient cathedral of the city; some parts about the portal are of the 12th century. S. Niccolo (modern Romanesque) with groined roof to the nave and ailes, has only a shallow recess for a chancel. S. Agostino of the Dominicans, begun 1226, and completed 1303 by B. da Bologna, was destroyed 1822.

The palazzo della Municipalità, or *della ragione*, was commenced 1172 by P. Cozzo; continued from the foundations between 1209-19, when it was covered with *legname con archi:* re-roofed 1306-15 by fra Giovanni da Padova, who added the two lateral loggie; the round arch external and lower arcades are very much later, perhaps 1420 by Rizzo and Picino after the fire of that year, who repaired, etc., the hall and formed it into one, it having been divided into three (probably by screens). The hall, dismantled 1756 by a whirlwind, was restored by B. Ferracina, who traced the meridian line across the pavement. The present iron roof was put up 1857. The hall is rhomboidal, being 257 ft. 3 ins. and 261 ft. 7 ins. on the sides, and 88 ft. 10 ins. and 87 ft. 9 ins. at the ends: in height it is 72 ft. 6 ins. to the eaves under the battlements from the ground, and 87 ft. 4½ ins. from the pavement of the hall to the soffit of boarding under the ridge: all these are English dimensions taken 1854 by G. Aitchison. DIDRON and BURGES, *Iconographie de la Ragione grande Salle de l'hôtel de ville de P.*, 4to., Paris (1858), xi. The two Egyptian columns of basalt were presented 1819 by Belzoni. The *palazzo del Capitanio* (mixed style) was the former residence of the Carrara family: the exterior and the portal with double Doric columns are 1532 by G. M. Falconetto: the staircase by V. Dotto, also attributed to Palladio, is remarkably fine: the town library is in the vast cortile; it contains upwards of 100,000 vols. and 1,500 MSS. The clock tower inclines; the clock was put up 1344, but the works 1428. The *loggia del Consiglio*, now a military post, was designed 1493 by

Annibale Bassano; it was completed in carcase 1526, and was perhaps finished or built under his nephew Alessandro; it has been attributed to Sansovino: it was only finished 1761. The great hall is now dilapidated. The *palazzo vescovile* has been modernised. The *corpo di Guardia* (early Renaissance), the designer of which is not known, (*Illustrations*, s. v. Façade, pl. 45). The *museo civico* in the monastery of S. Antonio (the north front 1876 by C. Boito (phot. at Roy. Inst. of Brit. Archts.) contains a picture gallery, the Bottacini collection of antiques; a small candelabrum by Briosco: a numismatic collection; autographs, and engravings. The *biblioteca municipale* contains nearly 10,000 vols., and MSS. of local interest. The university or *studio* was celebrated as early as 1221; there are 46 professorships. Attached to it is a botanic garden, dating from 1543; and the *specola* or astronomical observatory dating from 1767 by don D. Cerati, which is placed on the mediæval tower of S. Tomaso. The palace of the university, called *il Bò*, or the ox, was begun 1493; the great court was designed by Sansovino, not Palladio. The anatomical theatre, built 1594 by Fabricino ab Aquapendente from a design by fra Paolo Sarpi, is the oldest in Europe. The *Gabinetto Antiquario e di Numismatica* adjoining contains several antique inscriptions. The *biblioteca capitolare* has upwards of 10,000 vols. and several MSS. The *seminario vescovile* next the church of Sta. Maria in Vanzo, contains a theological library of upwards of 40,000 vols.

The palazzo Cornaro, afterwards Giustiniani, was designed 1524 by G. M. Falconetto (built after a design of his client, according to Vasari), who also designed 1523-4 the rotunda for musical entertainments (for the plan, etc., see s. n. Falconetto). The fine palazzo Trento-Pappafava (Papafila) now belonging to count Cittadella di Vicodazzere is by Danieletti (Tschischka): the palazzo Zigno: the house of Eccelino now the marionette theatre of Sta. Lucia, has some Gothic windows preserved: the palazzo Venezze, of which the great gate in the garden is by B. Ammanato *cir.* 1583. The palazzi Abriani, Aldrighetti, Molino, nel borgo di Santa Croce, etc., are attributed to Palladio, to don D. Cerati, *cir.* 1770, and to A. della Valle (by Milizia): while the palazzo del conte Gir. Frigimelica, attributed to Palladio, is by a Paduan architect. The *teatro nuovo*, 1749-51 is by G. Gloria; there are also the *teatro nuovissimo*; and *teatro diurno*. The café Pedrocchi, of marble, deserves notice, it was designed 1831 by Giuseppe Jappelli; it is described in a pamphlet of fifteen pages. The *spedale civile*, erected 1778 by don D. Cerati, is for 500 patients; the S. Giovanni di Dio; and the instituto degli Esposti founded 1097, is the oldest of its class. The Monte di Pietà is by V. Dotto.

A casino for the Molino family near Padua is by V. Scamozzi. The Carthusian monastery, two miles distant, is by A. della Valle, though attributed to A. Palladio. The villa at Altichiero, then belonging to A. Quirini, is described by Wynne, *Descr.*, 29 pl., 4to., Padua, 1787. 12. 15. 26. 28. 96.

Accademia di Padova, *Saggi scientifici e letterari*, 3 vols., 1786-94; *Memorie*, 1809; *Nuovi Saggi*, 4 vols., 1825-38; 4to. *Padova*, plates, 1786-1838. Scardeonius, *De Antiquitate Urbis Patavii*, etc., fol., 1560. Pignoria, *Le Origini di Pad.*, 4to., 1625. Orsato, *Historia di Pad. à* 1173, 1678; *Monumenta Pat.*, 1652; and *Cronologia, etc.*, 1666. Facciolati, *Fasti Gymnasii Patavini*, 3 vols., 4to., 1757. Rossetti, *Descrizione*, 12mo., Pad., 1780. Brandolese, *Pitture e Sculture, di P.*, 8vo., Venice, 1795. *Storica dimonstrazione della città di Padova*, 12mo., Pad., 1767; and Selvatico, *Guida—per gli Scienziati*, 8vo., Pad., 1842; and 1869. Gennari, *Annali*, 3 vols., 4to., 1804. Moschini, *Guida*, 16mo., Pad., 1817. Moschini, *Dell' Origine—della pittura in Pad.*, 8vo., Ven., 1826. Brunacci, *Istoria Ecclesiastica di Pad.* Tomacino, *Bibliotheca Patavini*, 4to., Utini, 1739. Marchi and others, *Cenni storici sulle famigilie di P. e suoi monumenti dell' università*, 4to., Pad., 1842. Lalande, *Voyage en Italie*, 12mo., Ven., 1769, viii. Webb, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 258-83. Woods, *Letters of an Architect*, 4to., Lond., 1828. Hope, *Architecture*, 8vo., Lond., 1840, 3rd edit. Street, *Brick and Marble Arch.*, 8vo., Lond., 1855. Wiebeking, *Analyse, etc.*, 4to., Munich, 1838, i, pl. 11, gives the plans of Sta. Giustina and S. Antonio.

PADOVA (fra Giovanni da), degl' Eremitani, also called fra Giovanni Agostiniano, "travelled far and wide in Europe, and in Asia to the very Indies, and brought back plans and drawings of all the buildings he had seen; amongst others, one of the roof of a great palace in India. This pleasing the Paduans, they requested him to roof their hall, the sala della ragione," which he did 1306-15 (it was burnt 1420): and added the lateral loggie. As payment he received the materials of the old roof, which he put up to the nave of the church of S. Agostino degli Eremitani. He was also engineer to the communes of Padova, Trevigi, and Bassano. Rossetti, *Descriz.*, 12mo., Pad., 1780, p. 151, 282. Allgemeine Bauzeitung, 1849, p. 79. Ticozzi, *Dict.*, ii, 186. Marchese, *Lives*, 8vo., Dublin, 1852, i, 78. 3. 28.

PADOVA (Vellano of) see Vellano.

PADUA (Johannes de), as the name is printed in the grant of an annual wage, or fee of two shillings per day, given to him apparently for the first time, 30th June, 36th Henry VIII, (1544), as thus translated, "We of our especial grace and from our certain knowledge and mere motion (ex certâ scientiâ et mero motu), as well as in consideration of the good and faithful service which our well-beloved servant John of Padua has done and intends to do to us in architecture and in other inventions in music"—; the fee was to commence earlier, for "the said John hath served us in the said art from the feast of Easter, which was in the thirty-fourth year of our reign". This grant is given in full in Rymer, *Fœdera*, xv, 34; and copied into Walpole, *Anecdotes of Painting*, 4to., Lond., 1762: and it was renewed 3 Edward VI (1549), as in the *Fœdera*, xv, 189; Walpole, adds—"He was termed 'Devizer of his majesty's buildings. In one of the office books which I have quoted there is a payment to him of £36 10s. In the same place is a payment of the same sum to Lawrence Bradshaw"; with other fees as surveyor to the king.

The above is still all that is really known of John of Padua. Walpole quotes from two office books; i, a MS., which is identified as that published by Nicolas, *Privy Purse Expenses*, 8vo., Lond., 1827, from 17 Nov., 21 H. 8, (1529) to end of Dec., 24 H. 8 (1532), in which the name of this so-called architect does not appear: and ii, a folio MS., now in the British Museum, Arundel Coll., No. 97, dating from Feb., 29 H. 8 (1538) to Mids., 33 H. 8 (1541), consisting of 390 pages; in which the names of Nedam and Care, surveyors, and Holbein and Hornebrand, and other painters, appear, but not that of John or of Bradshaw, after a careful search; nor is it likely, for the year 1546 is the earliest yet found in which Bradshaw is mentioned as *surveyor*, although he is recorded in 1541, as noted s. n. Nedam, his predecessor in office. The term devizor was not a *new* one, as considered by Dallaway in his notes to Walpole; the article Devisor herein, shows its application nearly a century earlier. It is worthy of remark that the first grant was given in the year *after* the now known date of Holbein's death (1543), and *in* the year that Giovanni (Pennacchi) da Trevigi met his death at Boulogne, both having been employed by Henry VIII; while Nedam and then Bradshaw were the king's supervisors, or chief architects of his board of works.

The following buildings are attributed to John of Padua, but of course upon no evidence. Somerset house, 1546-49; also attributed to John Thynne, John Thorpe, and Pallady. Longford Castle, 1591-1612. These two buildings occur in J. Thorpe's drawings in Sir John Soane's Museum. Longleat, Wiltshire, 1567-80; the residence of Sir John Thynne, and also attributed to himself, and John Thorpe. The dial and gate of Honour, begun 1572, built 1575, of Caius College, Cambridge; but the college itself is attributed by professor Willis to Dr. John Caius (born 5 Oct. 1510, was at Padua 1542, died 1573), who gave "the exact model and pattern" to Theodore Haveus,

of Cleves, for the gate. Wollaton, Nottinghamshire; also to J. Thorpe and the Smithsons. Sion House, Middlesex, 1547. Hill Hall, Essex, 1564-68. Netling House, Bath, or a chimney piece in it, for Sir Walter Hungerford. Kingston House, Bradford, Wiltshire, 1567-79. Claverton House, Wiltshire, 1628, a chimney-piece therein to T. Haveus. Holmby or Holdenby House, Northamptonshire, erected by Sir C. Hatton, died 1591. Portico of Charlecote house, Wiltshire, 1558. Probably Catlage, Cambridgeshire, 1560, for Edward Lord North; and the large additions to Sudeley castle, Gloucestershire, for lord admiral Seymour, and now destroyed.

Willis stated that he considered John Caius and John of Padua to be the same person; and it is generally presumed that John Thorpe and John of Padua are one. WYATT, *On the Foreign Artists employed in England*, read at Roy. Inst. of Brit. Architects, *Sessional Papers*, 18 May 1868, p. 234, has followed the old statements. W. P.

PÆONIUS of Ephesus, in conjunction with Demetrius, is usually stated to have completed about 380 B.C. the third last temple of Artemis (Diana) at Ephesus, begun about B.C. 600 by Theodorus of Samos, which had been left unfinished by Chersiphro or Ctesiphon, and Metagenes about B.C. 560; and was burnt 356 by Herostratus. It is now considered that Pæonius or Paionius restored between B.C. 400 and 356 the Ionic octastyle temple damaged by fire about 400, and known as the second last temple: the last temple (the one discovered 1871 by J. T. Wood) was built for Alexander the Great, and was in progress in 334; FERGUSSON, *Hypæthrum of the Greeks*, read at Roy. Inst. of Brit. Architects, 22 Jan. 1877, p. 80. With Daphnis of Miletus Pæonius erected about B.C. 376 a temple to Apollo near Miletus, supposed to be the Ionic decastyle temple of Apollo, the details of which are given s. v. Didyma. VITRUVIUS, vii, pref. FERGUSSON, ut sup. p. 89.

PÆONIUS of Mende, in Thrace, was a sculptor who flourished after Olympiad 82; SILLIG, *Artists*, 8vo., Lond., 1836: and executed the subject in the eastern pediment of the temple to Jupiter at Olympia, built Olymp. 84.

PÆSTUM, the modern name of POSEIDONIA, in Southern Italy.

PAGAHM, PAGAN and PAGAAN. A ruined city of Burmah, situated below Ava on the river Irawaddy; and still famous for its numerous temples and other remains. It was founded in the middle of the ninth century, and destroyed 1284 by the Chinese or Tartar army of Kublai khan; during which period a very extensive series of monuments was erected, most of which still remain in a state of very tolerable preservation. They were coincident with those of Pollonarua in Ceylon, excelled them in extent and magnificence, and had remarkable differences in form and detail. The ruins extend about 8 miles along the river, and with an average width of about two miles, and the remains of about 800 or 1000 temples may be traced. The Ananda temple, nearly 200 ft. square with projections making about 280 ft. square, and seven stories high, or about 183 ft. The Thapinya temple, *cir.* 1100, 201 ft. high. The Gaudapalen temple, 1160, smaller but richer: another the Dhamayangyee, is in ruins; and the Sem Byo Koo is in its details the most beautiful. FERGUSSON, *Indian, etc., Architecture*, 8vo., Lond., 1876, p. 614-8, taken from YULE, *Mission, etc. to Ava in* 1855, 4to., Lond., 1858. SYMES, *Embassy to Ava in* 1795, 27 pl., 4to., Lond., 1800, i, 298. CRAWFURD, *Journal of Embassy in* 1827, 4to.; 2nd edit., 8vo., Lond., 1834, plates. COX, *Burmhan Empire*, 8vo., Lond., 1821, p. 412-20. At Pagan, the arch appears. From Pagan it seems to have been introduced at Buddh Gaya; according to FERGUSSON, it has the only example of a Hindoo temple with an arch in it, which, as stated in an inscription, had been introduced during the repairs of the temple by a Burmese embassy 1306-09; ARCHITECT *Journal*, 1870, iii, 110. "Amongst the buildings at Pagan-myo, is a pagoda known as the cave of Ananda, where the gilded figure — stands in a vaulted cell, situated at the further extremity of a darkened aile. Into the alcove in which it is placed the only light that is admitted streams through an opening so situated as to be unseen by the spectator in front, and thence it is poured like a halo over the head of the glorified object below. This mode of illuminating an interior is common in the rock-cut basilicas of India," etc.: TENNENT, *Ceylon*, 8vo., 3rd edit., 1859; BUILDER, xviii, 55, with an illustration.

PAGANELLI (FRA DOMENICO). Stefano, born 1545, was the third son of Vincenzo Paganello, who was of an old family established at Faenza about 1200; he was admitted 5 June 1562 into the monastery of S. Andrea in Faenza under the name of Domenico; studied at Bologna, and removed to Rome 1585, where his talents secured him the patronage of cardinal Alessandrino, in whose service he spent thirteen years, and for whom he designed 1585 at Rome the palazzo (afterwards Bonelli, and later Imperiali, and sometimes, as by MILIZIA, attributed to D. Peparelli) in the piazza de SS. Apostoli, given in FERRERIO, *Palazzi*, fol., Rome (1655), pl. 23, 24, and 88; it is said to have cost about 60,000 dollars: the cardinal at his death left Paganelli a pension of 100 dollars as remuneration for all his toil in his behalf. Cardinal Alessandro de' Medici, afterwards pope Leo XI, appointed him his architect, and, when dying, (1605) also gave him a pension of 100 dollars: after which period many of the cardinals and other princes and Roman barons gave him constant employment. At Faenza in 1583 he commenced the works for the supply of water from two and a half miles' distance, and the fountain, which were not completed until 1617: TONDUZZI, *Historia di F.*, fol., F., 1675; SCALETTA, *Il fonte di Faenza*, 8vo., F., 1719; and RIGHI, *Annali*, 1840, have described them. Having then fixed his abode in his native city, he expended all the money he had received in the erection of many fabrics, and the rebuilding and enlargement of the monastery of S. Andrea; MAGNANI states that the choir of the church was restored, and that the chapel del Rosario was decorated, from his designs. With the money paid him for supplying the water, he purchased a villa which he bequeathed to the monastery. At Forli, he designed 1619-35 at the east end of the cathedral the chapel La Madonna del fuoco, in the Corinthian order, and richly decorated; it was preserved when the cathedral was pulled down for rebuilding, *cir.* 1840. He died 23 March 1624 aged 79; a tomb was placed in the first cloister of his monastery, the inscription on which is given with a memoir in MARCHESE. 3. 87.

PAGANO (GIORGIO) da Marozia, *ingegnere*, was engaged upon the cave della Gandoglia in Milan cathedral, 10 August 1399, after Gaspare da Carona, another engineer, who is mentioned 23 July of the same year. 27.

PAGENY (master), made *cir.* 1509, the *patrone* which showed the moldings, for the tomb of king Henry VII at Westminster; but was discarded by the king for the one made 1516 by Torrigiano; Lawrence Ymber, karuer, made the *patrones* in timber for the images, according to the Harl. MS., No. 297, the original of which was in the chapter house at Westminster. BRITTON, *Arch. Antiq.*, 4to., Lond., 1809, ii, 20-1. NEALE, *Westm. Abbey*, fol., Lond., 1818, i, 55.

PAGLIA (FRA DOMENICO), furnished the design of the rich chapel of S. Domenico in the chiesa di Minerva at Rome; he also designed the grand piazza opposite to the bridge of S. Antonio at Sanseverino in the marches of Ancona. He flourished in the seventeenth century. 87.

PAGLIANI (COSMO), designed the grand and impressive palazzo Lanfreducci at Pisa, also attributed erroneously to M. A. Buonarroti. He lived in the sixteenth century. 28.

PAGNO DI LAPO PARTIGIANI (RAFFAELLO), of Florence, also a sculptor, carried out 1448 from the designs of M. Michelozzi, the rich chapel of the Annunciation, and the adjoining chapel (which afterwards served as a choir for the monks) in the church of Sta. Maria Annunziata of the Servites, at Florence: a long description is given in VASARI, *Lives*, s. v. Michelozzi, edit. 1850, i, 508. Pagno also executed the font in the church of S.

Giovanni at Siena; gave a design for the palace erected 1460 at Bologna by Sante Gio. il Bentivoglio; destroyed by the populace 3 May 1507; and sculptured certain figures with his master Donato in S. Miniuto al Tedesco. The marble tomb of messer Pietro da Noceta, opposite to the chapel of the Sacrament in the church of S. Martino at Lucca, is attributed to him by Vasari, i, 510, but it is stated to bear the name of Matteo Civitali. 105.

PAGLIOCCO marble. One of the marbles now only to be found in the remains of ancient monuments; see Breccia and Giallo antico.

PAGODA. A word considered to be derived from *Puouta* by Du Halde, ii, 164: from the Persian *pout* idol, and *ghada* temple: to be a corruption of the term *dagoba*, the relic shrine of the Buddhists, from *dhatu* relic, and *gabba* or *garba* shrine or womb, (Fergusson); and to be a corruption of the Sanscrit *bhagarati*, holy house. It is generally applied by Europeans to Hindoo *temples* in the East from China to Hindustan. These structures generally consist of a *mantapa* or porch, a *mundof* or vestibule for the priests, and a *mindra* or inner sanctuary containing the idol, enclosed in courts often of great extent, with walls having the *gopura* or gate pyramids. The lofty tower, commonly called pagoda, of the Chinese is properly termed Taa.

Fergusson, *Indian Arch.*, 8vo., 1876, describes the Black pagoda (or temple) at Kanaruc, a form of tower or spire called *sikra* or *vimana* containing the cell, and surmounted by an *amalaka*, and again by a flat dome of reverse curvature, on the centre of which stands a *kullus* or pinnacle. Of the *stupa* at Buddh Gaya, erected before the beginning of the sixth century, he says (p. 70), "this straight-lined pyramidal nine-storeyed temple, retaining all its essential forms—anomalous and unlike anything else found in India, either before or afterwards, but probably the parent of many nine-storeyed towers found beyond the Himalayas, both in China and elsewhere."

PAGOT (François Narcisse), born at Orleans 31 August 1780, became a pupil of Delagardette and Labarre; and obtained 1803 the first grand prix of architecture, for a harbour, given in Allais, etc., *Projets d'Arch.*, fol., Paris, 1806, pl. 114-8. For his native city he designed 1821-4 the palais de justice (Doric); 1823 the abattoir; and 1826 the corn market; of which three buildings medals were struck; the last was published by the conseil des bâtiments civils: the library; the hospice des aliénés, the first stone of which was laid 1 Oct. 1828, and for which he obtained a gold medal: the buildings of the barriers; the hospice de Patay; the dépôt de mendicité; rebuilt the church of Gien; restored the church of Cléry; completed in 1829 the cathedral of the city with its portail: and commenced 1828 the restoration of the cathedral at Bourges. The Protestant church at Orleans, 1836, a rotunda of 47 ft. 3 ins. diam. (ii, pl. 279); the botanic gardens and houses, 1841 (ii, pl. 281); and the abattoir above-mentioned (iii, pl. 46), are given in Gourlier, etc., *Choix d'Edifices Publics*, fol., Paris, 1845-50. A country house near Orleans, 1838, is given in Normand, *Paris Moderne*, 4to., Paris, ii, pl. 138; and 1845 a house and grounds on the banks of the Loiret, iii, pl. 106-8. Pagot was professor of architecture at Orleans, where he died, 4 Dec. 1845. 110.

PAIL. A vessel carried by hand by means of a swing handle at the top. It is used for containing liquid; commonly water for washing purposes. When filled to the usual height, so as not to allow the contents to slop over when being carried, it contains 2½ gallons. It is frequently used for carrying mortar in place of the hod; and for limewhite, colour, etc. It was formerly always made of wood staves hooped together, but of late years of galvanized iron rivetted, or, frequently, "brazed".

PAI-LOO. "The Chinese name for the 'triumphal gateway', as it is most improperly called. Its origin is distinctly Indian, but from its nature, being easily overthrown, few examples can be found in a country that has so long ceased to be Buddhist. The gateway at Sanchi is, however, the typical example of the whole class; and it is afterwards represented in bas-reliefs and frescoes in a manner to leave no doubt of the frequency of its application. In China, the *pai-loo* seems almost universally to be employed as an honorific monument of a deceased person—either men of distinction, widows who have not married again, or virgins who have died unmarried; and is erected in a conspicuous place apart from the sepulchre. Frequently they are constructed in wood, and when stone is used they retain to this hour the forms and details of wooden construction. Whatever the material, they consist of either two or four posts, set either on the ground so as to allow a passage through, or on a platform. The posts carry a rail or frieze bearing an inscription. Above this are other roof-like details completing the design. At Sanchi, erected about the Christian era, they are used as gateways to a simulated tomb. In India both the tumulus and the *pai-loo* had at that time passed away from their original sepulchral meaning; the one had become a relic shrine, the other an iconostasis. Two thousand years afterwards in China both are found still used for the purposes for which they were originally designed"; Fergusson, *Indian, etc., Architecture*, 8vo., Lond., 1876, p. 701, giving a woodcut of a pai-loo at Canton, and a larger one forming the entrance to the city Amoy, from Wright and Allom, *China Illustrated*, 4to., London, (1858), ii, p. 69.

PAIN (William), called in his publications architect and joiner, and architect and carpenter, published *The Builder's Pocket Treasure; or, Palladio delineated and explained*, 44 pl., 8vo., 1763. *Practical Builder; easy manner of Drawing and Working the whole or part of a Building; Rules of Carpentry*, etc., 83 pl., 4to., 1774, new edit. *Builder's Golden Rule; or, Youth's sure Guide in Architecture and Carpentering*, 98 or 104 pl., 8vo., 1782. *Carpenter's pocket Directory; framing timbers, centerings, plan and section for a barn*, 24 pl., before 1786. *Practical House Carpenter; centreing, roofs, skylights, the five orders; designs for Houses, Stables, a Church, etc., Chimney-pieces, etc., Staircases, etc., with prices*, 148 pl., 4to., 1794, 5th edit.; 6th edit. before 1810; 1823; and edited by S. H. Brooks, 100 pl., 4to., 1860-1. *Carpenter and Joiner's Repository; or, a new System of lines, etc., for Doors, etc., Staircases, Soffits, etc.*, 69 pl., fol., before 1786: and *British Palladio; or, Builder's General Assistant; all the rules of Architecture; designs for Houses, etc., with prices*, 42 pl., fol., 1786; 1793; 1797; 1804. In this last work he was assisted by his son James, builder and surveyor. The above is all that has been found respecting them, except the date 1770 as the death of William, which is obviously an error.

PAIN (James and George Richard), sons of the James Pain above-mentioned, were born, the former about 1779 at Isleworth in Surrey, the latter about 1793 in London. They were apprenticed to John Nash, who, having designed Lough-cooter castle for lord Gort, recommended the brothers as builders. They consequently went to Ireland, where James settled at Limerick, George at Cork; from the then necessity of the period, they acted as architects and builders; George, an accomplished draughtsman, more especially competing with builders for the execution of his own designs and specifications. Through Nash's influence James was appointed architect to the Board of First Fruits for the province of Munster, having the charge of all the churches and glebe houses, George acting as his assistant, hence between them a large number were built, altered, and repaired. The churches of Buttevant, Midleton, and Carrigaline, which have a tower and spire, are among their best specimens of the Gothic architecture of the period. They carried out some works at Lismore cathedral, and at Emly, co. Limerick; and designed several mansions, as Mitchelstown castle, near Cork, for the earl of Kingston, given in Neale, *Seats, etc.*, 2nd ser., 4to., Lond., 1825, ii, which is perhaps the largest and best of their works; Strancally castle, near Lismore, on the river Blackwater; Dromaland castle, co. Clare, for lord Inchiquin; Convamore castle, for earl Listowel; Blackrock

castle, near Cork, for the corporation of Cork, small but very picturesque; and Castle Barnard, King's co.

The following works marked † are attributed to James; * to George, and ‡ to both brothers. † 1817-21 the county gaol at Limerick, costing £25,000. ‡ 1818 the county gaol at Cork (Doric), considered at the time the most perfect institution of the kind in Ireland. * 1825 Holy Trinity church at Cork (engraved). ‡ 1826 the County club house, cost £4000. * 1828 remodelling internally of Christ Church in the Grecian style and removing the tower. * 1828 remodelling of S. Mary's R. C. church, with an elaborate third pointed ceiling. * 1830 the church at Castle Hyde, near Cork. ‡ 1831 the Independent chapel (Italian). ‡ 1831 Bael's, Ball's, or Bawl's bridge at Limerick of one arch over the abbey stream. At Cork, * 1832 the Capuchin friary of the Holy Trinity (Gothic), still unfinished *cir.* 1860: * *cir.* 1834 S. Mary Shandon church: ‡ 1835 County and City court-houses: * 1837 S. Luke's chapel of ease (Third pointed): and * 1836 Roman Catholic church of S. Patrick (Corinthian): † 1839-43 Thomond bridge over the river Shannon at Limerick; and Athlunkard bridge about a mile distant, having five large elliptic arches. An entrance gate to Lota near Cork, consisting of a large archway flanked by Ionic columns, and two side entrances; besides many other churches and private residences throughout Ireland. In March 1834 one of them gained the competition for a museum and lecture room in the court of Trinity College, Dublin (CIVIL ENGINEER, ETC., *Journal*, 1838, i, 93). George died 1838, aged 45 years, and was buried in S. Mary Shandon churchyard. James retired, and is living at Limerick, being now (1877) in his 98th year. They had brothers in London, Henry and Thomas, the former also a pupil of John Nash.

PAINE often printed PAYNE (JAMES), born 1725, was a student in the S. Martin's Lane academy, attained the power of drawing both the figure and ornament well, and designed them for his own works. His first designs appear to be;—*cir.* 1740 Cusworth, Yorkshire, the two wings for Wm. Wrightson (died 1760): (NEALE, *Seats, etc.*, v; WOOLFE and GANDON, *Vitr. Britt.*, fol., Lond., 1767, i, pl. 89-92). 1745-48, Doncaster Mansion house, (the principal room being 60 ft. long, 30 ft. wide, and 30 ft. high), which he published in 21 plates, fol., Lond., 1751. 1751, Nostell or Nostal, Yorkshire, for sir Rowland Winn, bart. (d. 1765), "after the design of one which sir R. had seen during his travels on the continent": subsequently Adam designed four wings, of which only one was erected, but was not completed (1831) inside, and was to be pulled down; (HUNTER, *South Yorkshire*, ii, 219: NEALE, iv: WOOLFE and GANDON, *Vit. Britt.*, fol., Lond., 1767, i, pl. 57-63.)

Having also published his principal works, entitled *Plans, etc., of Noblemen and Gentlemen's Houses executed in various Counties; and also of stabling, bridges, public and private temples, and other garden Buildings*, 2 vols., fol., Lond., 1767, in 74 pl.; and 1783, in 101 pl., they will be mentioned in the order as given therein. *Volume I contains*, 1758-63 Chatsworth, the great stables, 200 ft. sq. outside, 115 ft. square court-yard; 1762 a bridge over the river Derwent; 1759-60 Welden bridge over the river Trent; all for the duke of Devonshire. 1752 Cowick hall, Yorkshire, for viscount Downe. *c.* 1755-64 Gosforth, Northumberland, for Ch. Brandling, esq. 1754-8 House for sir M. Featherstonehaugh, bart. (d. 1774), at Whitehall, now Melbourne or Dover House; the domed entrance and portico are by J. Holland. Belford, Northumberland, for Abraham Dixon, esq. Serlby, Nottinghamshire, for viscount Galway. 1758-63 Stockeld park, Yorkshire, for Wm. Middleton, esq. 1763 Lumley castle at Sandbeck, Yorkshire, for earl of Scarborough. Bywell, Northumberland, for Wm. Fenwick, esq. Axwell park, Durham, for sir Thos. Clavering, bart. 1744 Heath, Yorkshire, for Mrs. Hopkinson. S. Ives, Yorkshire, for Benj. Ferrand, esq. 1761 Gibside, Durham, chapel and mausoleum for Geo. Bowes, esq. 1762 Banqueting house in the plantation at Forcet, Yorkshire, for James Shuttleworth, esq. Temple at Bramham park, Yorkshire, for lord Bingly. Gopshall, Leicestershire, temple for Charles Jennings, esq. *Volume II contains*, 1763-64 Worksop Manor house, Notts., for Edward ninth duke of Norfolk, the former house having been burnt 20 Oct. (or 22 Nov.) 1761, except the chapel and part of the east wing; 500 rooms were destroyed: only the north side of a quadrangle was rebuilt, 318 ft. long: this was sold 1838 to the duke of Newcastle for £375,000, exclusive of the furniture; (SUTTON, *Date Book:* NEALE, iii.). 1764-70 Thorndon hall, Essex, for lord Petre, (view in WRIGHT, *Essex*, ii; NEALE, 2 ser., ii). 1770-76 Wardour Castle, Wiltshire, built anew for Henry, eighth lord Arundel; the chapel and sanctuary were by sir J. Soane; (NEALE, iii: BUILDER *Journal*, 1858, xvi, 548). 1761 Keddlestone house, Derbyshire, for lord Scarsdale, carried out by R. and J. Adam with alterations, (as shown in the *Vitruvius Britannicus*, iv). *cir.* 1760 Stapleton park, Yorkshire, for Edward Lascelles, esq., afterwards earl of Harewood; great alterations; (NEALE, iv). *cir.* 1750 Brocket Hall, Stanborough, Herts, for Sir Matthew Lamb, created lord Melbourne, and bridge in the park; (NEALE, 2 ser., v). 1769-70 Hare Hall, Romford, for J. A. Wallenger, esq. (view in WRIGHT, *Essex*, ii; NEALE, i). Shrubland hall, Suffolk. Weston, Staffordshire, the temple of Diana. In London, Lord Petre's house, Park Lane; Dr. Heberden's house in Pall Mall; and one for honble. Thomas Fitzmaurice in Pall Mall, using Adam's stucco to the front. 1780-3 Bridges at Richmond, with Kenton Couse, sec. to H.M. Board of Works; at Brocket hall; at Weston, and at Chillington, Staffordshire. Six ceilings. Several chimney-pieces, including one for sir J. Reynolds, Leicester Square; two at Melbourne house; and at Park Lane: and the pediment at Worksop manor.

Among his other works exhibited and mentioned in publications are—1759 North rooms of a house for a person of distinction in Derbyshire. 1764 Lodge at Hardwick near Durham, for John Burdon, esq., as a residence during the rebuilding of his mansion house. 1765 Academy or exhibition rooms for the Incorporated Society of Artists, (converted 1790 into the Lyceum theatre). 1766 A nobleman's house in the country, now building. 1767 A house for a nobleman in Essex. 1783 Drawings (at the Royal Academy) of Chertsey, Walton, and Kew, bridges, all then building. 1783 Salisbury Street, Strand. 1783-5 Chertsey or Littleton bridge, Surrey, of seven arches, the centre one 42 ft. span, cost £13,000; (BRAYLEY, *Surrey*, ii, 231): Lastly, 1783-89 Kew Bridge, Middlesex, 400 ft. long, of seven arches, the centre one 66 ft. wide and 22 ft. high; (FAULKNER, *Brentford*, 168).

JONES, *Seats of England*, 4to., Lond., 1829, etc. (same as that of NEALE), gives views of Chatsworth, Worksop, Nostell, Cusworth, Hare hall, and Thorndon. WATTS, *Views of Seats*, 4to., Lond., 1779, etc., gives views of Worksop, pl. 13, Thorndon, pl. 17, and Axwell, pl. 77. PATTERSON, *Roads* by Mogg, 8vo., Lond., 1822, p. 65, 223, 278, 327, 332, 446, notices some of the buildings. His plans are well arranged and commodious, and the buildings soundly constructed and well built; but some of the designs are meagre imitations of the Italian school: and GWILT, in his memoir of sir W. Chambers, 1825, p. xlix, notices that "Paine and Sir R. Taylor divided the practice of the profession between them until Robert Adam entered the list, and distinguished himself by the superiority of his taste in the nicer and more delicate parts of decoration."

He is said to have been appointed clerk of the works at Greenwich hospital by the patronage of the Rt. Hon. Richard Arundell of Northallerton; advanced to the royal mace and again to Richmond New Park, and Newmarket; and was promised the comptrollership of the king's works; but on the death of Stephen Wright, master mason, was advanced to the rank of a board officer, by the title of architect to the king, but was at once displaced 1782 by Mr. Burke's Reform Bill, without gratuity or pension: also said to have been one of the attached surveyors of the crown in the Land Revenue department. He

was a member of the artists' committee, appointed 1755 to devise the establishment of a royal academy: exhibited 1762-67 at the incorporated society of artists of Great Britain, of which he was a member; and became president about 1765, which was the cause of great recrimination and ill-will: in 1782 and 1783 he exhibited at the royal academy of arts; and in 1783 he was high sheriff for Surrey: and in the commission of the peace for Essex, Middlesex, and Surrey. In 1764 he was living in a spacious house in S. Martin's Lane which he had built for himself; removed 1766 to Salisbury Street; and subsequently to Addlestone, or Sayes Court, near Chertsey, Surrey, the lease of which he had purchased, while building 1785 Chertsey bridge; his son tenanted the house for a few years. To this residence he made some additions in the Elizabethan style, and formed a fine collection of drawings. He retired to France in consequence of age and some domestic grievance, and died there about Nov. 1789 in the 73rd year of his age. He had a son JAMES, and two daughters, one of whom married Tilly Kettle the painter. Among his pupils were Ebdon, who exhibited at the royal academy, 1767 a view of the interior of Durham cathedral; and J. Kendall of Exeter, who exhibited 1781-84. GENTLEMAN'S MAGAZINE, lix, ii, 1153, gives a short memoir, the only one the compiler of the present notice has found. REDGRAVE, *Dict. of Artists*, 8vo., Lond., 1874, gives a few notes.

JAMES, son of the above, was a member of the S. Martin's Lane academy, and exhibited "stained drawings" at the Spring Gardens exhibitions 1761-64-70: 1781 at the royal academy of arts, an elevation of a design for a national monument to the earl of Chatham; 1783 the elevation of a court in a prison; and 1788 an intended bridge across Loughfoyle at Derry. He was 1791 one of the original fifteen members of the Architects club (MULVANY, *Life of Gandon*): and "James Paine, esq., Arch. R.A.B." appears in the list of subscribers in some copies of MALTON, *Lond. and Westm.*, fol., Lond., 1792. His father by his will dated Feb. 1786 probably left his son independent, which may account for his name not being found later, except as to having "bequeathed 1834" (date and place of death are unknown) to the Bodleian library at Oxford the brilliant picture by sir J. Reynolds, painted June 1764, of the portraits of himself and his father, which was exhibited 1867 at the Portrait Exhibition (second) at South Kensington, and is now in the University gallery; it was engraved 1764 by J. Watson, and shows a scroll inscribed "Charter of the Society of Artists". This portrait, with a small stippled one of the father, dated 1798, are in the collection of the Roy. Inst. of British Architects. There is another similar plate for "*a set of artists*" by P. Falconet and engraved 1769 by D. P. Pariset; also a small one by F. Hayman, engraved by C. Grignion, prefixed to Paine's publication of 1751. REDGRAVE, *ut sup.* In the library at the South Kensington Museum is a large folio volume with "J. Paine, jun., Archt., Rome, 1774" on the outside; it contains 57 drawings of studies at Rome, all signed by him, being plans of four palaces, with views at Albano and Tivoli, measured drawings of the ponte Rotto, and a number of statues with their measurements. Also two volumes of drawings, one having 23 examples of rosettes, etc.; and the other having 44 of ornaments, vases, mirror frames, etc., both of which are attributed to one of the Paines. W. P.

PAINE (THOMAS), the well-known political writer, is only here mentioned as the designer of the second cast-iron bridge in England, which was made by Messrs. Walker at Rotherham in Yorkshire, and brought to London, where it was erected and exhibited for some time at a bowling green in the New Road. It was originally intended for America; but the materials were afterwards used in constructing the bridge over the river Wear, at Bishop's Wearmouth, Sunderland. It consisted of one arch 236 ft. span, being a segment of a circle of 444 ft. diam. (with a versed sine of 34 ft.) and 100 ft. high from low water. A series of 105 blocks formed a rib, and six of these ribs formed the width of the bridge, which was 32 ft.; etc. A model of this bridge was deposited at the Society of Arts, etc., in the Adelphi; ELMES, *Lectures*, 8vo., London, 1821, p. 411. But POPE, *Treatise on Bridge Building*, 8vo., New York, 1811, p. 112-18, states that the chief projector was Rowland Burdon, esq., M.P. for the county of Durham, who, after a stone bridge (by J. Nash) was given up, was assisted by Thomas Wilson, a truly ingenious man, and he learnt much about iron bridges from Messrs. Walker's of Rotherham; together they constructed and set up an experimental rib at Rotherham, which succeeded; and the first stone of the bridge was laid Sept. 1793, and opened 9 Aug. 1796. In the biography of Paine it is stated that in 1787 he went from America to France and submitted to the Academy of Sciences at Paris a plan for the construction of iron bridges; but meeting with no encouragement, he left for England, and entered into partnership with an iron founder at Rotherham, and explained the principles of his construction in a letter to Sir Geo. Staunton, printed 1789. After 1803 he published in America another treatise on iron bridges; and died on his estate near New Rochelle, Baltimore, 8 June 1809, in the 72nd year of his age. 14.

PAINSWICK STONE. A limestone of the oolitic formation obtained from a quarry near Gloucester. It is composed chiefly of carbonate of lime and oolitic grains, and weighs in an ordinary state 125 lbs. per foot cube. Its chemical analysis is carbonate of lime 97·61, carbonate of magnesia 81, carbonate of soda 71, water 75, protoxide of iron 39, and silica 22. The colour is almost white, and it is worked with the dry saw like Bath stone; it is harder than Corsham stone, and about 75 per cent. that of Portland stone. It is not a weather stone; for projections in outside work, the local Murhill Down Bath, and Bisley, stones are recommended in BUILDER *Journal*, 1860, xviii, 805. Painswick stone has been used in the interior of the Houses of Parliament; and for steps and landings in staircases in houses built by speculative builders, and extensively so in Roupell Park, Brixton. An early instance of its use is the pavement 1790 of Wanstead church, Essex, by T. Hardwick. S. T.

The best stone of this sort is said to be only obtained from the Ball's Green quarry, near Stroud. It is easily worked when first quarried, gets exceedingly hard as it dries, is used chiefly in staircases, chimney-pieces, altars, screens, fonts, tracery windows, floors, etc., and is a good building stone for the interior of churches and mansions. The entrance to the quarry is generally at the side of a hill, so that the mode of penetrating the earth or clearing the rock is done by blasting. The beds so blown to pieces average about 3 ft. 6 in. in thickness, but the ceiling and bottom of the quarries run level, the rock between them being raking, so that in some places the blowing bed is 7 ft. and even more in thickness. The beds of rock between this and the bottom vary in thickness from 3 ft. 6 in. to 5 ft. 9 in. The top beds are the best stone, being considerably the hardest, and are wrought much cheaper in a green state. The lower beds are softest and easier worked, not so fine in quality, rather spotted, and sometimes have dark sand-holes in them; nevertheless it is a thorough good building stone. The average thickness of rock between ceiling and bottom is about 22 ft., and to make first-class work stone should not be used more than about 2 ft. thick, as there are small yellow tracings visible, which do not look so well to the eye; and at these places the beds are forced with wedges for first-class work, but not without order. It is not always necessary to place this stone on its bed; being much used for tracery and long lengths for mullions, etc., where narrow widths are required, they can be cut solid from blocks without the least bed being detected, or the least harm to work so fixed. Although this stone is not supposed to stand the frost, it can be used with perfect safety with a weather-stone plinth at bottom and a slight cornice at the top of the building. E. T.

PAINT. A mixture for white work, of white lead or zinc white ground very fine and worked up in a liquid. For light-coloured work, each is mixed with an earth, an animal, or a

vegetable colour, or a metallic compound, to the tint required; for very dark-coloured work, the same without the whites. The various *colours* or pigments are noticed in this work under their several names. The liquids in use are linseed oil, sometimes boiled with litharge to render it drying, and hence called boiled oil; and oil or spirits of turpentine, called technically "turps". These are combined for use in various proportions according to circumstances; when the paint is required to bear a gloss, or is intended for inside work, most oil is used; and for black, chocolate colour, green, etc., for outside work, boiled oil alone, or with a little turps, is best. For flatting, which has no gloss, turps alone is used. To all paint, a little sugar of lead, or litharge (driers), should be added to make it dry quickly. It is important that all surfaces intended to be painted should be thoroughly dry, otherwise the paint will be liable to peel off.

Sweet oil of turpentine has been so prepared that when used with white lead, it is free from smell, while the colour is improved in appearance. Spirits of turpentine is a solvent of linseed oil, and when it is mixed with paint it renders the mixture more fluid, thereby facilitating the spreading of a thin and even coat over the surface. It is very volatile, and soon evaporates, but a small portion is converted into resin by the absorption of oxygen, the same as the oil, and therefore it adds slightly to the body of the paint. In evaporating it opens the paint to the action of the atmosphere, and thus hastens the process of solidification. The lighter portions of those hydrocarbons which unite to form petroleum are solvents of linseed oil, and therefore serve to render paints more fluid. They are also volatile and evaporate from the mixture when exposed to the air. But none of the hydrocarbons of petroleum absorb oxygen, or change to resin; naphtha, therefore, adds nothing to the solid body of paint: BUILDING NEWS *Journal*, 1864, xi, 820.

The substance generally constituting nine-tenths of the body of paint, is carbonate of lead, commonly called *white lead*, the quality of which is therefore of the greatest importance to the durability of the work; it is said to improve by being kept for several years before use. Besides the three qualities manufactured, six or more chief modes of adulteration have been recorded: 1, by carbonate of lime, as chalk, whiting, etc.; 2, sulphate of lime, as gypsum, selenite, plaster of Paris; 3, carbonate of baryta; 4, sulphate of baryta; 5, pipe and other clays; and 6, starch, flour, etc. Fine whiting ground in oil is very difficult of detection; it not only renders the paint a much less compact body, but causes it to be more easily acted upon by the atmosphere, thus blanching it and destroying it when subject to repeated washings. The use of these adulterations will in some measure account for the great difference that exists in the prices asked for painters' work; which in one case of four tenders varied from £1555, £1019, £965, to £792. White paint ought to consist of carbonate of lead; what it often is it would be difficult to say. It will sometimes rub off like a coat of whitewash. Even if really good paint and oil of the best quality are obtained, still, as something to cause the paint to dry quickly is almost a necessity, particularly for outside work, the best paint may be spoilt with it. The protoxide of lead—litharge—is an excellent drier for dark colours; the acetate of lead—sugar of lead—is equally good for light colours, but some stuff called "patent driers" is generally used; and hence arises defective work. Paint is not so good as it was, because mineral turpentine is used very largely with it. In scamping work, varnish is sometimes added to make the paint bear out, so as to deceive as to the number of coats. The *crawling* of paint and varnish may be caused by the use of shellac as a drier. After standing until the paint is hardened, it takes upon itself the property of repulsion, so that if covered with varnish, the latter will crawl from the surface into ridges. The most effective remedy is stated to be, to rub the surface of the paint with a good clean flannel cloth before commencing to stripe or varnish; BUILDING NEWS *Journal*, 1869, xvii, 140.

In the BUILDING NEWS *Journal*, 1870, xix, 66, an article on the *Adulteration of Paints* by prof. H. E. Cotton, enumerates sulphite of baryta or barytes; the use of water instead of the full quantity of oil or spirits of turpentine; of benzine, etc. *The Frauds of Painters*, in BUILDER *Journal*, 1865, xxiii, 514-5, has a good article on the subject, reviewing LECLAIRE, *Dialogues sur la Concurrence sans Lunites dans la Peinture en Bâtiments, ainsi que dans la Dorure, la Tenture, et la Vitrerie*, 8vo., Paris, 1842: and referring to the previous works of this house painter of Paris, *Recueil de Notes sur les Abus introduits dans la Peinture en Bâtiments, ainsi que dans la Dorure, etc.*, 4to., Paris, 1841; and *Des Améliorations qu'il serait possible d'apporter dans le Sort des Ouvriers Peintures en Bâtiments*. He later wrote *Recherches concernant l'influence qui peut avoir l'essence de térébenthine sur la santé des ouvriers peintres en bâtimens*, 8vo., Paris, 1861; and *Mémoire sur les fraudes qui ont lieu dans l'entreprise de peinture*, 8vo., Paris, n. d.

The other metallic white paint is ZINC WHITE, well known for its intense whiteness, resistance to sulphurous and other deteriorating causes, and harmless qualities with regard to the painter and to the inmates of the house under decoration.

The best paints usually employed in house painting, and which preserve best the wood, have for bases white lead, minium, oxides of zinc, and lampblack.

Various modern Paints, most of which are described under their names; with the date of their introduction.

1870 Gay's patent impenetrable paint.
1817 Roman Oil paint, an anticorrosive paint; and Roman white paint.
Patent Indestructible and Enamel paints; and the patent enamel solution.
1865 Pulford's Magnetic paint.
Vanherman's impenetrable anticorrosive paint.
1874 Crete enamelling paint, no smell.
1872 New Petrifying Silicate paints.
Warner's Silicate of iron paint.
c. 1795 Carson's original anticorrosive paint.
Sezerelmy's paints, and Granitic paint.
1867 Patent black Varnish paint for iron, wood, or stone.
1870 Quick drying inodorous paint.
Soluble Glass paint. Gold paint.
1855 Lacboracic. Grafton waterproof paint.
Griffith's enamel paint. Silicate Paint Company.
1843 John's patent stucco paint. Black paint.
Zinc white paint. Oxide of iron paint.
Waterproof paints. Preservative paints.
Varnish painting. Water-glass paint.
1870 Jay's Metallic Paint Company.
1843 Brickwork, Waterproof, Sylvester's process.
India-rubber or enamel paint, patented 1863-65 by F. G. Mulholland, noticed in BUILDER *Journal*, 1866. xxiv, 690, with a similar one by Dr. Brion of Paris.

The French have a very useful paint—perhaps the Chromoduro-phane, having a glass face, and drying in two hours. The price was three francs the kilo., which does 5 metres sup. in two coats. Viard's paint was much noticed, being No. 1521 of the 1855 Exhibition. Dupont's (of Cherbourg) Hydrocarbure, in the Exhibition at Paris of 1860, and of London 1862; and that by Ruolz and others, chiefly of pitch or wax; oxide of iron being used to remove the dark colour of the pitch; BUILDER *Journal*, xx, 732. A new Paris paint is described as composed of 10 lbs. of purified yellow wax, 10 lbs. of linseed oil, dissolved together by heat; 8 lbs. of spirits of turpentine, 5 lbs. of common resin, dissolved together by heat; the colour to be mixed with the oil, and afterwards mixed with the remainder, making a pasty compound; BUILDING NEWS *Journal*, 1859, v. 684; and DUBLIN BUILDER *Journal*, 1861, 424.

Painting in milk, as it was called in 1805 and 1823, and said to be used in place of distemper or oil paint, by means of a composition made with two pints of skimmed milk, eight ounces of slaked lime, six ounces of linseed or nut oil, five pounds of Spanish white, and two ounces of Burgundy pitch: the pitch is to be slowly melted in the oil, by a gentle heat; then the mixture of milk and lime added to it, it being previously heated. so as to prevent the too sudden cooling of the pitch. A sub-

stitute for this resinous milk may be made by mixing 144 parts of very dry powdered skimmed-milk cheese, 7 parts of slaked lime, 240 parts of Spanish white, and 2 parts of finely powdered charcoal, with 80 parts, by weight, of water. This receipt has also been put forward as successfully applied to gates, rails, and palisadoes, the Spanish white being stated as three pounds, and five pounds in other receipts, and the milk two quarts instead of pints. Two coats are to be laid on with a painter's brush, the expense of which (then) was about a halfpenny a square yard.

A valuable composition for colouring gates, pales, etc.—Melt twelve ounces of rosin in an iron pot, and three gallons of train oil, with three or four rolls of brimstone. When the rosin and brimstone are melted and become thin, as much Spanish brown or red or yellow ochre (or any other colour), ground fine with oil as usual, is to be added, as will give the whole as deep a shade as desired; it is to be laid on as hot and as thin as possible; some days after the first coat is dried a second is to be given. It is well attested that this composition will preserve plank for years, and prevent the weather driving through brickwork: (Receipt given by Lord Stanhope).

Other things being equal, paint dries more quickly in a temperature of 25° to 28° than in one of 15° or 18°. This explains how, in practice, the proportion of drier varies with the temperature. Thus, in winter is added to the linseed-oil with which the lead is mixed, from 3 to 9 and even 10 per cent. of drier, while in summer it is limited to ½, 1½, or 2 per cent., if not entirely omitted, particularly in the last coat; CHEVREUL. Outside work painted in October looks better at the end of four years than it would in two years, if painted in May or June; the heat of the summer's sun completely extracts the oil, before it has time to harden. *On the drying properties of various kinds of house paint*, BUILDER *Journal*, 1868, xxvi, 909, 942.

The "painters' desideratum", a *medium* for mixing with white lead and other pigments to form paint, in lieu of linseed oil, boiled oil, turpentine, and driers, to permit of one coat of paint following another more rapidly than usual; is said to be perfectly inodorous; dries sufficiently in half an hour to permit of a second coat; does not blister on exposure to heat; and cleans readily; BUILDER *Journal*, 1870, xxviii, 121; BUILDING NEWS *Journal*, 1870, xix, 318.

To remove paint.—Caustic paste is much recommended where carving is concerned: it does not discolour the wood, and comes off with the old paint in washing. A liquor manufactured by G. D. Honeyman and Co., of Gateshead-on-Tyne, cleanses the wood thoroughly in a few minutes. To remove paint off Portland stone, some receipts are given in BUILDER *Journal*, 1857, xv, 212; 253: and, to 3 lbs. of common washing soda add a gallon of water, and put it on hot with a common paint brush; this will soften the paint in a short time, so that it can be removed with a stiff scrubbing brush; afterwards, on adding a few ounces of potash to the solution, it is softened more readily. A hot solution of pearl-ash or common potash will soften paint in a few hours, applied as often as necessary; BUILDER *Journal*, 1870, xxviii, 1012. Paint is often removed from flat surfaces by heat, as red-hot irons, or a coke fire applied to it by means of a hand-basket, but these are now superseded by the application of a flame from a lamp or from gas. *Patent and other processes for removing old paint from wood*, in BUILDING NEWS *Journal*, 1870, xix, 281, explaining the use of hot irons; burning the paint off with naphtha or turpentine; by a portable fire-grate; by the application of a flame of gas, or of oil; the chemical mixtures for softening paint; and that of Gray's (of Glasgow) "painter's solution". Also in xxii, 282. The comparative effects of ether, benzol, bisulphide of carbon, and chloroform on old painted work showed that the last, applied on wadding with gentle friction, speedily exposed the clean surface of wood, whilst the ether and benzol removed the more recent only of the layers of paint; the carbon was apparently without action; BUILDING NEWS *Journal*, 1866, xiii, 125. LETHICIUM.

To clean paint.—A piece of flannel smeared with common whiting mixed to the consistency of common paste, in warm water, should be rubbed on the surface to be cleaned quite briskly, and washed off with pure cold water. Grease spots and filth will be removed easily, and the paint will recover its brilliancy and beauty: BUILDER *Journal*, 1855, xiii, 560. When flatted work has to be cleaned, care must be taken not to use any strong alkalies, which will remove the coat at once.

To remove smell from fresh paint.—Trays and pans of water should be placed in the newly painted room, near the walls, and an ounce of vitriolic acid put into the water; in a few days this mixture will absorb and retain the effluvium from the paint, but the water should be once or twice renewed. A bundle of old dry hay, wetted and spread about the floor and furniture is also of service; it must be kept damp, for the oily vapour does not seem to be readily absorbed unless the air is kept moist by evaporation; BUILDER *Journal*, 1852, x, 609.

PAINTED ARCHITECTURE. The name given to the production by a scene-painter of a picture upon a wall, when the subject is painted in such a manner as to appear at the first glance to be an actual construction. This has been a feat very common in Italy, in ceilings of the Italian style, and the memory is still retained at Aigueperse of one instance, which required the sense of touch in order to convict the eye of having been deceived by an illusion. OPTICAL ILLUSIONS.

PAINTED GLASS. This term properly explained, would comprise white glass, which had been perhaps first roughed and then a coat of oil paint or distemper given to it for the purpose of obscuring its transparency. For some positions, white glass is so treated by "stippling", by which such a coat of paint prevents anyone looking through it either way.

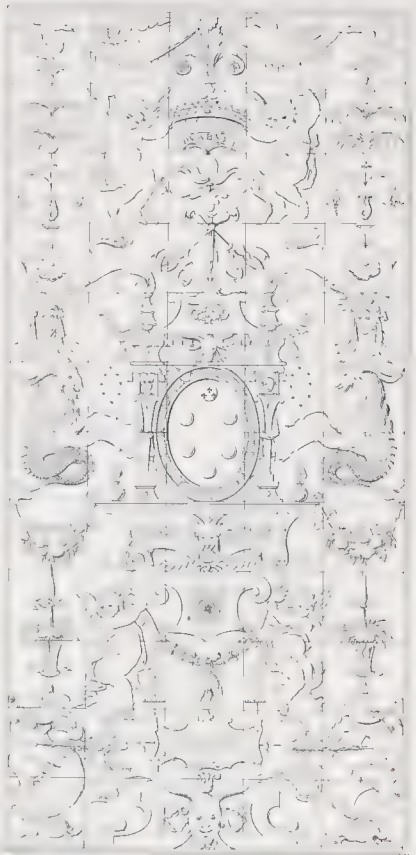
The term is more often used in connection with STAINED GLASS, where drawing and pictures are introduced, many of the colours used being the same as in enamel painting. In *painting* on glass, the colours remain on the surface of the glass and interfere more or less with its transparency; in *staining* glass, the colour sinks in, leaving it as transparent as before. Painted glass attempts to give all the effect of an actual painting, strictly so called, and to heighten this effect by the gorgeousness and transparency of the colours, and can be made very attractive. But this must not be confounded with the other, and more simple, and more architectonic, style; such as GRISAILLE, (s. v., and *Illustrations*, 1861, pt. 2). Usually, the design having been drawn on paper, white or uncoloured glass is laid thereon either in small or large sizes, according to the subject, as the pieces will best join together; or arranged in plates for the later styles of architecture. The outline is traced on the glass with a black or brown pigment, and the parts intended to be of a yellow, orange, or red, tinge are then coated according to the tint required. The glass is then "fired", the former work becomes fixed, and the latter stains the glass. Other colours, as necessary, composed as for enamel painting of metallic oxides, are put on, and the glass is again fired; in most cases the glass is fired after the application of each colour, as some colours require more heat than others. For slips, draperies, etc., glass already coloured in the manufacture (called POT METAL) is selected, and this is shadowed, diapered, etc., as required. When all the pieces of glass are prepared, they are united by means of grooved leads called *cames*. *Illustrations*, 1863-65, s. v. Painted Glass from the library at Florence.

Further description will be given under STAINED GLASS, of which art this, or Painted glass, is a material portion, especially during the later periods of the mediæval style; and it is carried out further in the present day as a means of embellishment in other styles of architecture.

PAINTER. An artisan who works up materials and applies them to the surfaces as directed. *House painters* in Italy display much skill and taste; there is a class of them greatly excelling those in this country, having more the feeling and taste of the artist. He is not a mere machine like the workman







from Rossi,
LA LIBRERIA MEDICEO LAURENZIANA,
at FLORENCE, 1739

in this country, who has little use for an intellect beyond enabling him to use his moulds, stamps, and the various mechanical contrivances, which confine all decorative arts here within such commonplace limits: beyond plain painting, the house painter in England becomes a decorator! "With us, the practice is chiefly confined to that of a mere handicraft, where little refinement is sought for, beyond the simple usage of the painter's shop, the mixing up of colours, and their smooth application to the wall. Whereas, in Italy, the study and acquirements of a house painter are little inferior to what is requisite for the higher branches of the art; and in fact the practice of both is not unfrequently combined," etc., EDINBURGH ENCYCLOPÆDIA; quoted in a long article, *Decoration—House painting*, given in the ATHENÆUM *Journal*, and reprinted in CIVIL ENGINEER, ETC. *Journal*, Jan. 1844, x, 460-64, having reference to aspect, colour, dark or light, decoration of ceilings, etc. Painters' work is an item of considerable importance in the cost of a house to an owner, or to a tenant on a repairing lease. It is so now in the majority of cases, because the work is done in a manner not calculated to ensure durability; and whilst the primary object is not reached, unless at excessive cost, the scarcely secondary one of gratification of the mind through the eye becomes impossible of attainment for persons of ordinary means. WORKMAN. WAGES.

PAINTERS' TOOLS. The requisite tools are *brushes* of hogs' bristles of various sizes according to the work; distemper stock brushes, and lime brushes, which are fastened by a binding of wire, string, or leather, close to the root end of the hair (BUILDING NEWS *Journal*, 1870, xviii, 278: xix, 22); a *scraping* or *pallet-knife*; *earthen* or *tin pots* to hold the paints, and one for turpentine; a *grinding stone* and *muller*, etc.

The glazier's HORSE is very often required by the painter, when painting the outside of sash windows. The glazing machine, or travelling stage, devised by MR. FOX for use in the Great Exhibition Building 1851, and the machine for painting sash bars, are given, figs. 45 and 46, in INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1851, x, 161. Roberts' self-acting painting machine for painting a large number of flat strips of wood or metal, is described in BUILDING NEWS *Journal*, 1874, xxvi, 409. The moveable platform, which can be raised or lowered by the parties on it, for repairing or painting the façades of houses, has now generally superseded the use of ladders.

The *diseases* of workers in lead and paint is treated of in the BRITISH MEDICAL *Journal*, and extracted in BUILDING NEWS *Journal*, 1869, xvi, 558. CHRISTISON, *On poisons*, 8vo., Edinb., 1829; 4th edit., 1845. THACKRAH, *On the effects of Arts, Trades, and Professions*. Alum is said to be a specific remedy for the painter's colic; ALL THE YEAR ROUND *Journal*, 1862, vii, 560. PENNY CYCLOPÆDIA, s. v. Painter's Colic.

PAINTER'S WORK, or PAINTING TO BUILDINGS, usually called HOUSE PAINTING. *Limning* is the old term for working with water colours; *Distemper* is working up a colour with whiting and a gluten; and *colouring* is with whiting and gluten only; while *painting* is working up colours with oil. It is the art of covering the surfaces of wood and metals with a mucilaginous material, which, acquiring hardness by exposure to the air, protects the material to which it is applied from the effects of the weather. In *architectural painting* three ancient methods were employed: namely, fresco, encaustic, and tempera, with many modifications of each: these, with their principles and practice, were advocated by GAMBIER PARRY, at the Wiltshire Archæological Society, and reported in BUILDING NEWS *Journal*, 1865, xii, 759-60.

CLEARCOLE. COLOUR. DECORATION. DISTEMPER and Colouring. ENCAUSTIC. FIRST COAT. FRESCO. GRAINING. IMAGERY. KNOTTING. LIMEWHITE. MAROUFLAGE. OIL PAINT. PAINT. PIGMENT. POLYCHROMATIC DECORATION. STAIN. TEMPERA. VARNISH. WHITEWASH.

In the paper *On Fir, Deal, and House Painting*, by W. PAPWORTH, read at the Royal Inst. of Brit. Archts., 2nd Nov. 1857, an account of the decoration of houses in England is given from the thirteenth century; in it he states that "it may be concluded that 'house painting' did not come into fashion until about the period of the monarchs William and Mary, and Anne, up to which time either colouring by distemper or by whitewash had been in vogue for plaster-work, leaving inside woodwork more or less untouched." He then describes the methods of house painting, as follows.

"In every branch of painting in oil applicable to buildings, the general process will be found very similar, with the exception of such variations as easily suggest themselves to the careful workman. The first essential is that the wood, plaster, or cement should be perfectly dry. This is acknowledged by all, and yet when despatch is the order of the day, it must be neglected One writer states that 'perhaps in general cases, where persons are building on their own estates or for themselves, two or three *years* are not too long to suffer the stucco to remain unpainted; though now frequently in speculative works as many weeks are scarcely allowed.' The woodwork having been prepared for fixing, has first to undergo the operation of *knotting*, in order to prevent the turpentine in the knots of fir-wood from passing through the several coats of paint. (KNOTTING). The general method is to cover the parts with a "size knotting"; the most common mode is to paint them with red ochre, which is worth nothing. The next process is that of PRIMING, which consists in giving a coat of white lead with red lead, and a little drier in linseed oil. This is the first coat, and upon which the look of the paint on completion much depends; and when the material is quite dry, this first coat is readily absorbed by it. The first or priming coat is put on before *stopping* the work, should that process be required: it consists of filling up with putty any cracks or other imperfections on the surface of the wood: if the putty be introduced before a coat of colour is laid on, the putty does not adhere, and becomes loose when dry. After the application of this first coat, the painter removes by pumicing all irregularities from the surface, especially those rendered apparent by the knots and fibres of the wood. A smooth surface being thus obtained, a second coat is given, consisting of white lead and oil—about one-fourth part of turpentine is sometimes added for quick work. If four coats are to be put on, this second one has sometimes a proportion of red lead, amounting to a flesh colour; but if only three, it is generally made to assume the tint of the finishing coat. It should have a good body and be laid even. This coat, when thoroughly dry and hard, is in best work rubbed down with fine sand paper, and carefully examined to ascertain whether any further stopping be required; and then the third coat or *ground colour* applied, of a somewhat darker tint than wanted when finished, having sufficient oil for easy working, but not too fluid—thus two-thirds oil and one-third turpentine are employed; or sometimes equal proportions of oil and turpentine. The *flatting* coat may then follow, the object of which is to do away with the gloss or glaze of the oil, and to obtain a 'flat' or dead appearance. The advantage is not confined to the look of the paint, for it assists in hiding all defects in the wood or other material that is painted. White lead is mixed with turpentine, to which a little copal varnish is sometimes added, and when the tint is put in it is always made lighter than the ground colour, or it would when finished appear in a series of shades and stripes. Flatting must be executed quickly, and the brush is generally, if not always, carried up the wall and not across it. It must be understood that a flatting coat is not considered as a coat of paint; being wholly of turpentine, it is by exposure to the air evaporated, leaving a thin coat of pigment which is only required for effect, not for use. Some painters, particularly where the work is required to dry rapidly, use a large proportion of turpentine in the several coats; thus the ground coat has two-thirds oil and one-third turpentine. If four coats are to be laid on, the third has a little more turpentine than usual, which in the second is about a quarter, and so on. *Turpentine* on the whole, is chiefly useful for the

purpose of saving oil and labour; it should not be employed where lasting work is required. The necessity of having the substance perfectly dry before it is painted has already been noticed, and it is equally important that each coat of paint should be quite hard before another is applied, more especially where the work is exposed to the sun. Plasterwork to be painted requires some additional care in the workmanship itself; unless it be quite good the lime works out in minute bubbles and destroys the effect of the paint, which can only be corrected by rubbing down and repainting, even then with no great certainty of success. Some persons advocate the use of a priming or of a second coat, made of strong double size stained with some colour to mark where the brush goes. The second coat then consists of white lead in all oil, used as stiff as possible; the third coat is made of single size with a little white lead ground in water to mark the course of the brush; and the fourth coat of white lead in two-thirds oil and one-third turpentine, with a little blue black to take off the rawness of the white. Such work as this is now generally repudiated; those in its favour state that it is of equal benefit with a coat of paint for inside, but confess that it is not so for outside work. Its objectors state that such 'sheepskin' coats prevent the paint from sinking into the wood or plaster, causing the paint to peel off and chip. When inside work has to be finished of any colour, it becomes necessary to provide for it at the third or second operation, according to the number of coats; particularly if the work is to be finished flat, or as it is termed, dead white, grey," etc.

"All new *outside work* should be primed a flesh colour, mixed in all linseed oil. The second coat may be of the same mixture if four-coat work is to be done; and in this coat all defects are to be made good. If three coats only are to be applied, this one should be laid on with care. The third and fourth coats, whichever may be determined upon, are generally white, stone colour, lead colour, chocolate, olive and invisible green, all in linseed oil. When white lead is employed alone, it has been recommended to dilute it with half drying or boiled oil, and half linseed oil, as the boiled oil affects the colour of the white lead a little, but in all other colours boiled oil may be considered the best for the purpose of preservation."

"When it is required to cover a painted material, or to repaint, the surface must be prepared to receive the coats of paint;—it is sometimes first washed, or if the work be very greasy, turpentine is used, after which the paint is rubbed down with pumice stone and water, or with some potash in it, until an even surface is obtained, removing any knobs or imperfections in the previous coatings. In repainting, the first coat is called 'second' colouring, the old work being considered equal to a primed state. It is composed of white lead, turpentine and oil, with the pigment required for the colour that may be wanted. Some painters use two-thirds turpentine and one-third oil; others three-fourths turpentine and one-fourth oil; and even all turpentine, dryer, and a very little red lead; but this last must be worked very quick, crossed once, and laid with the grain of the wood, as it is not much better than a flatting coat. For third colouring or finish, the white lead is thinned with half turpentine and half linseed oil, dryer, and a very little blue black, to take off the rawness of the white, and also to make it cover better. For the best rooms the flatting coat is required as before described. Two good coats of new paint are frequently sufficient for ordinary work where painted previously. Light coloured work, as margins, rails, and so on, is generally painted before the darker work, as mouldings, etc. Carved work especially requires care to prevent the work being clogged up."

"Where the face of old work presents a very bad and uneven appearance from blisters or other causes, the inequalities are filled up with a cement. Modern specifications often require that the woodwork should have four or more coats until the paint 'bears out'. This is certainly necessary when it may be anticipated that little oil will be used, or where the priming and early coats may not be properly attended to; the result is a deadness in one part, the glaze standing out in another. It often happens, too, that the sun and air have quickly dispersed the greater part of the most valuable quality of the paint, *i.e.*, its oil, and the work presents the same flatness. Care is also required when constantly painting in chocolate or black; if these are made too thin with boiled oil, blisters will occur, which cause the paint to peel off and leave the wood almost bare."

"In painting *plaster work*, white lead and linseed oil with some litharge as dryer, are mixed to the consistence of thin cream, and applied; the oil is entirely absorbed into the plaster in a few hours. This coat will perhaps be sufficiently dry in a day or two, when another, a little thicker, is given, the oil of which is also wholly or only partially absorbed, according to the nature of the plaster. In a few days a third coat can be applied, made rather thick, and (according to the absorption of the oil from the second coat) one-fourth or less of turpentine is added, and likewise the pigments approaching to the tint required. Should the plaster be thoroughly saturated, the flatting or finishing coat is applied as before described. When very durable work is required, a fourth coat is put on, thinned with equal proportions of turpentine and oil, and then the flatting coat. If the plaster be not flatted, the last coat is made of two parts turpentine to one of oil. By thus painting, plaster is rendered incapable of absorption, and its surface becomes hardened by the oil to a depth of about an eighth of an inch, rendering it less brittle, and enabling the surface to be washed. To effect absorption quickly, painters sometimes give the plaster two or three coats of boiling linseed oil, which are soon absorbed, and then give it the other coats of paint."

It has been stated that an unpainted timber bridge having a macadamized roadway was perfect; whilst another, painted and paved with Guernsey pebbles, rotted away—and suggested that skirtings and linings to stores and buildings, if not painted, would last much longer, as the damp behind would then be allowed to evaporate by the action of the external air; LANDER, *On Painting Timber when exposed to Damp*, in CORPS OF ROYAL ENGINEERS, *Papers*, 4to., Lond., 1842, v, 281-2; CIVIL ENGINEER, ETC., *Journal*, 1842, p. 253. PALING.

PINCOT, *Treatise on the Practical part of, Coach and House Painting*, 8vo., Lond., n. d. (*cir.* 1770), stated the *price* of painting is to be obtained thus: 35 p. c. for paint, 35 p. c. for labour, and 30 p. c. for profit. MAVIEZ, *Traité de Peinture en Bâtiment*, 8vo. *Le Peintre et Décor.; ou recueil d'échantillons de bois, marbres, etc.*, 4to., Paris, 1835. CHABAT, PETIT, et BISIAUX, *Journal Manuel de Peintures, appliquées à la Décoration des Monuments, Appartements, etc.* (being imitations of woods, marbles, etc.), nearly 650 coloured plates (vol. 22 in 1872), fol., Paris, 1850-76). TINGRY, *Painter's and Varnisher's Guide*, 8vo., Lond., 1804; 1816; and 1832. WHITTOCK, *Decorative Painter's, etc., Guide*, 74 pl., 4to., Lond., 1827; 1828; 1832; and 1841. HIGGINS, *Painter's and Decorator's Companion*, 4to., Lond., 1841 BARBER, *Painter's, etc., Assistant*, 12mo., Lond., 1852. *How to paint a House; or, Every Man his own House Painter and Colourman. The Painter and Decorator* (Weale), 12mo. MERRIFIELD, *Painting, Gilding, etc.*, 8vo., Lond., 1849. BYRN, *The Artist and Tradesman's Companion* (Art of Varnishing, Staining, Painting, etc.), 12mo., New York (1853). SMITH, *Art of Painting in Oyl and Varnishing*, 12mo., Lond., 1685; 1687; 8vo., 1821. SALMON, *London and Country Builder's Vade Mecum*, 8vo., Lond., 3rd edit., 1755; 1760. THOMPSON, *Oil and Colourman and Painter's Manual*, fol., Lond. (1860). *The Theory and Practice of Modern House Decoration*, in BUILDING NEWS *Journal*, 1870, xviii and xix. DAVIDSON, *House Painting, Graining, etc.* (Weale), 12mo. VANHERMAN, *Every Man his own House Painter*, 8vo., 1827; and *House Painter and Colourman. On Painting*, by W. PARSLOW, read at the Liverpool Architectural and Arch. Society, 1871; BUILDING NEWS *Journal*, 1871, xx, 169.

PAINTING ROOM. A room forming part of an artist's *studio*, and in which he designs and paints his pictures under a

purposely arranged light. An artist requiring a studio should necessarily be consulted by the architect before designing it, as in the experience of the writer each employer has had his own ideas of the studio he desired. All that is actually necessary for an ordinary room to be a painting room is a window on which the sun does not shine during working hours, with a means of excluding all other light. An artist, well known as a landscape painter in water colours, incurred recently much expense in securing a house with a room on the first story, about 19 ft. by 16 ft., and 10 ft. high, having two ordinary windows with the above qualification; and thus, enjoying the one great want of the artist, a uniform light undisturbed by varying sunshine, he considers himself possessed, in the room described, of a studio of great excellence. The next step toward the purposely erected painting room, consists in raising one or more of these north-looking windows up to the ceiling or above it; a change which, conspicuous externally, marks a room devoted to study and design in many parts of London.

The first studio designed by the writer, for an artist now a Royal Academician, is a painting-room open to the roof 25 ft. long, 19 ft. wide, and 16 ft. high to the wall plate. It is placed nearly east and west, and covered with a ridge roof having a "quarter pitch". The northernmost slope of the roof is entirely of glass from end to end, and rests on a row of windows 5 ft. high, also running nearly from end to end. The wall plate of the roof forms the head of the window frames, and has an eaves gutter fixed upon it. To this room is attached a lobby and a small room or cupboard, each about 5 ft. square, the cupboard fitted up for washing and cleaning brushes and palettes. At the west end of the studio, an opening 6 ins. wide and 15 ft. high, covered with removable wood linings, is formed, to admit of the passage of large pictures.

All studios are built nearly east and west, and the working windows and lights formed on the north side: a window on the south side carefully fitted with shutters has always been desired, as the power of admitting sunlight occasionally is important; but as on many visits to several studios it has never been seen unclosed by the writer, the need of it is probably very rare. The ordinary painting room is, whenever possible, placed, like the one already described, immediately under the roof. Unlike this one, however, it is usually provided with two windows only, of varying widths, commencing at varying heights from the floor, and extending as high as the roof, and into it as a skylight for a further distance of 5 or 6 ft. Each of these windows is fitted with shutters either folding in two or three heights, or hung with lines and pullies, or revolving, and rising from the sill. Thick blinds also are fitted to the skylights, descending from the top. It is well that the windows should be as free from shadow as possible, hence the desirability of omitting the wall-plate across the junction of the sash and skylight, which suggests external buttresses on either side the window, or other structural features, which shall indicate within or without the living want of the studio. At one of the windows described the artist paints, at the other the model is placed, and near this latter window a stove or other means of creating special warmth for the nude, or partially nude, figure must not be forgotten. Such a window as described, however, casts decided shadows upon the model it lights, and on this account is not always approved. An artist, indeed, whose pictures are noted among those of Royal Academicians for the delicacy of their tints and shadows, paints at such a window as here described (in a studio 27 ft. long, 16 ft. wide, and 14 ft. high to the collar of the roof), while for the model he has had a bow window constructed at the east end of his studio. The opening leading to this window is 8 ft. wide, and 8 ft. high, fitted with sliding doors so that the whole window or any part of it can be excluded from the studio. The window itself forms, on plan, five sides of an octagon 12 ft. 9 in. across. It is glazed all round and at top, the glass commencing at a height of 2 ft. from the floor. It is well fitted with thick blinds, which can be drawn over any part, and in it is placed the stove for the model.

Since the erection of this studio, the artist has had an inner quadrangle of his house roofed over and partly glazed. This covered court, which is open to the roof, forms a room 26 ft. 6 ins. square, and 11 ft. 6 ins. high to the springing of the roof, which is hipped all round, and has rafters forming an angle of 45° with the horizon. The lower half (in height) of the roof is slated and plastered, and the upper half glazed and fitted with ventilators. In the middle of this room is a fountain with its basin and water plants, and from the roof are suspended various caged birds. The large size of this room, and the light on its walls prove of such assistance in painting, that here, amid the splash of the fountain and the twitter of the birds, the artist works more frequently than in the specially prepared room.

Another studio to be described, which the artist in his enthusiasm calls "perfection", consists of a two storey building. On the ground storey is an octagonal entrance 10 ft. across, with a water closet, and also a room for tressels, picture frames, and artists' lumber, 20 ft. long, 18 ft. wide, and 7 ft. high, lighted by a large window, and having a flue for a fire-place if wanted. The entrance is partially lighted by loopholes, and out of it a circular staircase 4 ft. wide, also lighted by loopholes, leads to the painting room floor. The building is carefully placed on the ground, so that the sun does not shine on the north wall during working hours. The roof is a curb roof, the steepest part of which is just so inclined that the sun does not rise high enough to shine on it in the height of summer. Internally, the studio is 32 ft. long, 20 ft. wide, and 13 ft. high to the roof plate, and 19 ft. 6 ins. to the ceiling, which is level with the curb. There is a gallery across each end, 4 ft. and 5 ft. wide, and 9 ft. high above the floor of the studio; with dwarf railings in front, one bay of each being removable to facilitate the placing and removal of figures, busts, implements, and other "properties" of the artist. Between the gallery fronts and the ground floor is an enclosure, the spaces behind which are lighted by windows; the one at the east end forming a receptacle for pictures, while part of the one at the west end is divided into a lobby at the head of the stairs, and a cupboard with sink, and water laid on. The remaining part forms the entrance to a recess for "meditation and study". This recess, formed over the octagonal lobby, has a window on two sides fitted with shutters, and cushioned benches fixed round the walls, inside which are cupboards. While the painting room is thus 32 ft. long by 20 ft. wide, its floor space is ⌊ shaped, the central part being 20 ft. by 22 ft., and the full height of the room, and the remainder 9 ft. by 10 ft., and as high only as the under side of the gallery. The central part is lighted by one window in the north wall, and one window in the south wall, each 7 ft. wide, commencing 2 ft. from the floor, and extending up to the roof, and there continuing as a skylight as high as to the curb, or for a further distance of 7 ft. The wall plate is omitted at the junction of the window and skylight; and to further prevent the light being impeded, the casements and frames and the skylight bars are of wrought iron, while the lower part of the windows and the skylights are glazed with polished plate glass specially selected by the artist. The south window is fitted with folding shutters, and the north window with revolving shutters rising from the sill, and both have thick blinds to the skylights. To the body of this studio, it will thus be observed, there is only one window on the north side, a window, however, large enough to light at once the model and the artist at his work. This window is at the same time supplemented by the well-lighted recess for occasional use. Lastly, the studio is heated by hot water, and has a stove in addition.

Two peculiarities of this studio need specially be noted: 1st. The entrance, with its subdued light, which is a relief to the eye, and adds to the brilliancy of the light in the studio itself; 2nd. The recess for meditation which, lighted by its windows, not only adds greatly to the distance from which a picture can be viewed, but gives a feeling of retirement from his work, and repose to the artist, as he sits to meditate and to study. H. F.

The room used by Sir Joshua Reynolds at No. 47 Leicester Square, was octagonal in form, 20 ft. by 16 ft.; the one window was square, not much larger than half the size of an ordinary window, its lower part 9 ft. 4 in. from the floor. The sitter's chair was on a stand 18 ins. from the floor, and turned on castors. Reynolds' palettes were held by a handle; the handles of his pencils were about 19 ins. long. He painted near the window, and never sat down to his work. The painting room was furnished with sofas. The gallery leading to it, which still remains, was adorned with the most important pictures he had in hand, and in winter made comfortable with a blazing fire; Tom Taylor, *Leicester Square*, 8vo., Lond., 1874, p. 355. Sir David Wilkie's new painting room was 21 ft. by 20 ft., and 15 ft. high, with a high light and the fire under the light. J. D. Harding preferred a north light, as do all artists, following the dictum of Vitruvius, vi, 7, who says, "Pinacothecæ should have the same aspect (the north, as the summer triclinia), as well as rooms for embroidering and painting, that the colours used therein, by the equability of the light, may preserve their brilliancy."

The painting room or studio, designed by P. C. Hardwick, and built 1876 for J. E. Millais, R.A., at Palace Gate, Kensington, is on the first floor, and measures 49 ft. long, 26 ft. wide, and 24 ft. high, lighted by a window on the north side, 16 ft. high, and 9 ft. wide, which is a fixture, and by two smaller ones on north and south sides. The large one is glazed with four sheets of thick plate glass divided by iron transoms as slender as is consistent with strength and to obstruct as little light as possible; it has an iron revolving shutter. The walls of the studio have an oak dado about 4 ft. 6 ins. high, with oak pilasters at regular intervals up to the cornice; the panels thus formed are coloured a warm maroon tint. To maintain an equable temperature, besides the fire-place on the south side, there are three coils of 4½ ins. hot water pipes set in as many parts of the room. A grand staircase, a circular iron one for "models" leading into a dressing room, and a back stairs, give access to the room. A large trap door is arranged at the east end so that canvasses can be let down into the conveyance arriving by a private roadway adjoining, without their passing through the house. There are three sunlights in the ceiling. Building News *Journal*, 1876, xxx, 366, which further describes the house itself.

In the school of art, at University college, London, the platform on which the model is placed is movable, and the architect contrived a hot-water coil under it with a movable connection.

The ideal *studio* is an isolated greenhouse with blinds impervious to light, so that at the artist's will he can have any one light he pleases, or a combination of many lights. The objections to this are many; the unsightly appearance, difficulty of cooling in summer and warming in winter, exclusion of draughts, and the greatest of all, the exclusion of the light which is not wanted. Many artists now-a-days have a greenhouse attached to the studio, so that they can get an out-door effect under cover. The main desideratum for an ordinary painting light is, that it should be high, pure, and concentrated; and the amount required mainly depends on the size of the canvas employed, as every part of it should be equally and uniformly lighted. Most artists like a gallery in the studio, for painting figures at a balcony, and such like positions. A studio should be built so as to be as free as possible from noise, and from draughts; capable of being kept generally at a rather high uniform temperature, with the opportunity of raising the temperature considerably when nude models are sitting, to be cool in summer, and to be always well ventilated: but a large high room with skylights and many windows is not readily warmed, nor kept free from draughts. G. A.

The *Moniteur des Architectes*, iii, gives plans of a house for two artists, a painter and a sculptor. The house of — Jollivet, painter, at Paris, designed by A. Jal, is given in Builder *Journal*, 1859, xvii, 114, from Daly, *Revue Générale*, xvi, 73; 115.

PAIR. A term applied in a few instances to what is apparently only one thing: as a pair of stairs, which consists of the two flights, where they occur, of steps from one floor to another: a pair of organs, supposed to have arisen from the use of two bellows; a pair of hinges, consisting of the two flaps (Gemmel), though now meaning two complete hinges; a pair of steps; a pair of compasses; etc.

PAIS' of Glass. A certain measure less than a seam, which last, according to Willis, *Arch. Nomen.*, 1844, is 120 pounds or 24 stones. "1419. Et in iij sem' et in iij pais' albi vitri", etc.; Surtees Society, *Fabric Rolls of York Minster*, 8vo., Durham, 1859, p. 37, 64, 348.

PAISIERE (Raoul), of Picardy, in the fifteenth century erected a belfry at Hesdin, on which he was appointed to succeed Matthieu Regnault as master of the works of masonry to the city of Amiens. Duseval, *Recherches Hist.*

PAK (Thomas) was 1433 master mason at York cathedral, succeeding John Long, who is mentioned in 1421, and being succeeded by John Bowde, mentioned in 1442. Browne, *York Cath.*, 4to., Lond., 1838-47, p. 222; 231-2; 236. Surtees Society, *Fabric Rolls*, 8vo., Durham, 1859.

PAKASSY (Niccolo), freiherr von, hof architekt, designed the Francis bridge at Vienna, finished in 1803, over the river Danube; it has a wide arch, and is partly a suspension bridge. At Neustadt, in the environs, the old burg was adapted 1752 by him for a military academy. At Hetzendorf, he designed 1742 a pleasure house for Maria Theresa; it was repaired 1802; the chapel on the east side of it was painted in frescoes by Widon, an Englishman. The name Paccassi appears on an old print of the palace at Schönbrunn, as the builder of it. 14. 26.

PALA; Pala Kurou; Paulai merum; Mimusops hexandra. A wood of Cuddapah, East Indies. Pala Utan is a large tree of the forests of Penang. The wood is of a light brown colour, and used only for planks. Another Pala is a tall thin tree of the same colour, and also used for planks. 71.

PALACE. A word adopted in all European languages from the Latin *Palatium*, the name given by the emperor Augustus to his residence on Mons Palatinus at Rome. Its strict meaning is restricted to a royal abode, but it is often applied to any sumptuous habitation. In Italy, the term *palazzo*, taken by itself, is used for any large mansion or nobleman's house; and the French term *palais* is usually applied to edifices appropriated to the public service, as *palais de justice*, and to episcopal residences, etc.; *château* being used where in Italy the term *palazzo* would be adopted; in England, *castle* is occasionally used. "Enormous as have been the sums expended upon many of the modern royal edifices, every one of them falls very short of the ideal of a palace for a monarch, in which, if anywhere, not only all the luxury and pomp of architecture, but a certain colossal dignity of aspect should present itself. This can never be accomplished where stories above stories are displayed externally; that is but a vulgar species of architectural grandeur, which is produced by a numerical multiplication of little parts and features. All the rooms required for the accommodation of an extensive household should be turned towards inner courts, and the whole exterior, having only a single range of lofty windows above the ground floor, should be left for the unrestrained display of architecture and sculpture upon a noble scale, without any intermixture of littleness. By such a disposition, too, convenience would perhaps be found far better consulted than at present, because while all the apartments for official and state receptions and court entertainments would be connected together, the whole of the vast number of subordinate rooms required in such a habitation would be concentrated within the general plan, and at the same time might be kept entirely apart, by means of galleries between the outer and inner range, communicating at intervals with lesser vestibules and staircases attached to the suites of lesser rooms and private apartments of every description"; Penny Cyclopædia, s. v. This was written in 1840; the student can now be re-

ferred to the Louvre at Paris, with all the later additions made under the direction of the emperor Napoleon III, forming with the Tuileries the most extensive palace ever realised in modern times: the Vatican at Rome may also be cited. It has been stated that the palace at Caserta near Naples occupies 10½ acres; Hampton Court palace 8 or 9; that of S. James' 4; and Buckingham palace about 2½ acres.

At Rome, the "Palace of the Cæsars", comprising perhaps those of Augustus, Tiberius, Caligula, Claudius, Domitian, and Nero, as recently excavated, is shown in the *Plan des Fouilles du Palais des Césars*, by P. Rosa, dated February 1870. The best-defined remains form a block of about 490 ft. by 280 ft., the centre of which is a peristyle measuring some 205 ft. by 190 ft.; and the *tablinum* and *triclinium* are each about 116 ft. by 100 ft., in which the ordinary arrangements of a Roman house are adopted on a scale of splendid magnificence. Among others of the more ancient residences which have been noticed, are the palace at Constantinople built by the emperor Theophilus 829-842, said to have been a copy of one at Bagdad. The wonderful palace built at Bagdad by caliph el Motawakkel (Chesney, *Expedition*, ii, 466). The Byzantine palace at Constantinople damaged by the conflagration, was restored by Justinian (527-65) (Gibbon, *Decline, etc.*, xl). Of the palace of Theodoric (489-526) at Ravenna, an attributed remnant only exists. Mazois, in *Le Palais de Scaurus*, 8vo., Paris, 1819, has attempted to realize from such data as were accessible to him, supplemented by a lively imagination, some idea of a Roman palace: it was described, with a plan, by Spiers, in Building News *Journal*, 1873, xxiv, 544; 606. The palace of Diocletian (305-13) at Spalato, is the only one of the Roman world of which sufficient remains are left to judge of the extent or the arrangements of their palaces (Adam, *Palace*, fol., Lond., 1764). The palace of Attila (died 453) was constructed entirely of wood (Gibbon, *Decline, etc.*, chap. xxxiv).

There are few notices of any palaces in Egypt. Thothmes III erected behind the temple at Karnac, a palace-temple, 140 ft. long, by 55 ft. wide, the roof supported by two rows of massive square columns, lighted by a side light under the roof. The pavilion at Medeenet Haboo was evidently not a temple, as it has three stories, windows, small doors, staircases, balconies supported by a kind of caryatides and crenellations of which no other specimen is known; Description de l'Egypte. The palace erected by Solomon is known by the description in the Old Testament, 1 Kings vii, and in Josephus, *Ant.*, vii, 5. In the East should be noticed the lately discovered palaces of Nineveh, Khorsabad, Koyunjik, etc: the palaces at Persepolis and Susa: of Diarbekr, and El Hadhr; Serbistan, Firouzabad; Ctesiphon; etc.: Teheran, Ispahan, etc. In *Hindustan*, those at Jeypore and Oudeypore, the garden palace at Deeg; Agra, Mandoo, Beejapore, Jaunpore, Gaur, Delhi, Futtehpore Sicri near Agra, Allahabad, etc.: and that of Tiroomal Naik at Madura, near Madras; (Chisholm, at Royal Inst. of British Archts., 28 Feb. 1876); with a few modern vice-regal palaces. Hu-pi-lay in 1263 of the Mogul empire, built a palace for his ancestors after the example of those in *China*, as at Canton, Pekin, etc. The palaces or royal residences of *Ceylon*, as they were first constructed, must have consisted of very few chambers. The Loha Pasada conceived by Dutugaimunu, with its quadrangle 100 cubits square, and a thousand dormitories with ornamental windows, was in its turn surpassed by the castle of Prakrama I at Pollanarrua, which, according to "Mahawanso", was "seven stories high, consisting of 5,000 rooms, lined with hundreds of stone columns and outer halls of an oval shape, with large and small gates, staircases, and glittering walls"; Tennent, *Ceylon*, 8vo., Lond., 1859, 3rd edit. In *Mexico*, are the palaces at Mitla, Palenque, etc.

In *England*, the only edifices deserving to be regarded as palaces are;—the castle at Windsor, S. James's and Buckingham palaces, London; and Blenheim, Chatsworth and Trentham: Osborne and Balmoral are private residences: while Whitehall palace as designed by Inigo Jones, would, if it had been erected, have eclipsed all others at home and abroad. In Scotland is to be named Holyrood palace, Edinburgh. *Want of Accommodation for Royalty in England*, in Builder *Journal*, 1866, xxiv, 166.

In *Italy* are: the papal palace of the Vatican, and the Quirinal, at Rome; the palace at Caserta near Naples; the doge's palace at Venice; the palazzo Pitti, and palazzo Vecchio, at Florence; the royal palace at Turin; palazzo pubblico at Siena; the ducal palace at Ferrara; palaces at Palermo; at Genoa; Milan; etc. In *France;* the Louvre, the Tuileries, and the Luxembourg, in Paris, and Versailles, besides the numerous châteaux, as Blois; Chambord; etc. In *Spain;* the Escurial; the palace at Madrid; the curious Moorish palace (destroyed) at Azahra; that of the Alhambra; of Charles V at Granada, etc. In *Sweden*, the palace at Stockholm. In *Hungary*, Ofen, "the palace of the future" (Builder *Journal*, 1876, xxxiv, 974). In *Russia;* the palaces at S. Petersburg; the modern one in the Kremlin at Moscow: the design for the palace Orianda in the Crimea by Schinkel, (*Entwürfe*, 1848). In *Germany*, etc.; the palaces at Gelnhausen and on the Wartburg; the imperial palace at Vienna; and Potsdam; palaces at Munich, (Seidel, *Die Königl. Residenz in M.*, fol., Leip., 1876); Berlin (Dohme, *Das Königliche Schloss*, fol., Leip., 1876); Prague, etc. Town Hall.

Durand, *Parallèle des Edifices*, fol., Paris, 1800, with Le Grand, *Essai*, etc., 8vo., 1842. Brown, *Royal Palaces of Scotland, with description*, by Jamieson, 4to., Edinb., 1830. Brewer, *Palaces and Public Buildings, English and Foreign*, 4to., Lond., 1821. Androuet du Cerceau, *Des plus excellens Bastimens de France*, fol., Paris, 1571-9. Perelle, *Recueil des plus belles vues des maisons royales de France*, 428 eng., fol., Langlois, etc. (1680). J. Marot, *Recueil des Plans, etc., des Palais, Chasteaux, etc., dans Paris, etc.*, 124 pl., fol., Paris (1713). Marot, *Architecture Française, etc.*, 194 pl., fol., Paris, 1751, etc. Rigaud, *Vues des palais, etc., de France*, fol., Paris, 1752; 1757; 1780. Piranesi, *Vedute di Roma*, fol., Rome (1757), pl. 16, 43, 45, and 46. Verdier et Cattois, *Arch. Civile et Domestique*, 4to., Paris, 1857, gives some of the episcopal palaces of France. Pyne, *Royal Residences*, 4to., Lond., 1819, comprising Windsor castle, S. James's, Carlton house, Kensington, Hampton Court, Buckingham House, and Frogmore. 6. 14. 25. 96.

PALACIA. A word used in the account rolls of Finchale Priory, for a shed made of branches of trees and brushwood: Surtees Society, *Finchale Priory*, 8vo., Lond., 1837, p. 387; 439.

PALACIO (J. de), succeeded D. A. Motaude, 1530-70, as *maestro mayor* at the cathedral of las Palmas. 66.

PALACIOS; see Diaz de Palacios (P.)

PALA D'ORO or *pallio d'oro*. In the church of S. Marco at Venice is a magnificent enamelled metal decoration crowded with subjects, and made 976 at Constantinople, repaired 1105, 1209, 1345, and about 1840. It serves as the retable to the chief altar. Sommerard, *Album*, Ser. 10, pl. 32; texte iv, 64. *Handbook*, edit. 1842, p. 343; and other descriptions of the edifice. The *paliotto* or front of the altar in the church of S. Domenico at Palermo, is of silver: that of S. Ambrozio at Milan, is of gold plates, with silver at the sides and back. Labarte, *Arts of the Middle Ages*, 8vo., Lond., 1855, p. 114. 7. 28. 96.

PALÆSTRA (Gr. παλαίστρα). A place for wrestling, which originally formed part of the gymnasium of the Greeks; but there has been much controversy on the exact meaning at various periods. Plutarch, *Symp.*, ii, 4, expressly states "that the place in which all the athletæ exercise is called a palæstra"; and Pausanias, v, 15, § 5, vi, 21, § 2, states there were at Olympia palæstræ specially devoted to the athletes. The Romans had originally no such places, and when introduced towards the close of the Republic by the wealthy Romans in their villas, they used the names gymnasium and palæstra indifferently: thus Vitruvius, *De Archit.*, v, 11 (vi, 8), stating

that the palæstræ are not used by the people of Italy, yet gives a description of a Greek gymnasium under the name of palæstra. 78.

PAUSANIAS, v, 15, clearly shows that at Elis in the *gymnasium* were the courses for runners, and the sanded arenas for the fighters: hence the *palæstra* was for wrestling. LEAKE, *Asia Minor*, 8vo., Lond., 1824, 254; 340-41, gives a plan of the gymnasium or palæstra at Hierapolis, nearly filling a place 400 ft. square, from a drawing by C. R. Cockerell, and states that he "knows of only two other palæstræ or gymnasia, those at Alexandria Troas and Ephesus, given in Society of Dilettanti, *Antiq. of Ionia*, 1797, ii, pl. 40, 54." TEXIER, *Asie Mineure*, fol., Paris, 1849, ii, 189, pl. 107, states that he does not know whether the ruins at Alexandria Troas are gymnasia or palæstræ: and iii, pl. 142, illustrates a palæstra at Iassus.

PALÆOPOLI. The general name given to a number of detached villages occupying the site of the city of ELIS, on the western coast of Peloponnesus. A modern village of the same name partly represents the site of MANTINEIA in the Morea.

PALAEPEAN, a Sapotea. A wood of Tavoy, East Indies, is a very large tree, used in building. 71.

PALAN, Pallas, Palan samoo and Pinmass, Butea frondosa. The wood of this beautiful and useful tree of Cuddapah is hardly distinguishable from teak; the timber is large, but it is almost always knotted and gnarled. 71.

PALANGIER (PIERRE), built (*construisit*) 1514 to 1524 the church and the belfry of Belmont en Vabrais (Aveyron). He made for this building "une espèce de pourtroict et figure en deux feuilles de papier par long, enfilées et adjoinies, selon laquelle figure ycelle église et clocher se fairaient si bon leur sembloit (aux religieux de la collégiale)". MARLAVAGNE, *Art du Rouergue;* ADVIELLE, *Les Beaux Arts;* LANCE, *Dict. Biog.*, 1872.

PALE. A piece of wood, narrow in width, and of a height as necessary, affixed to rails to form a fence. PALING.

PALEARO (JACOME and JORGE), were known as *los Fratinos*, but whose real name was Palearo, according to Antonio de HERRERA, the chronicler of the Indies. They were first in the service of Charles V of Spain, for whom they constructed the new fortifications of Goleta; and for Philip II, those 1578 at Gibraltar, and 1592 those at Pamplona. JORGE also planned fortifications at Palma in Majorca; made a design for a new church at Melilla; and repaired several buildings which had been destroyed by an earthquake. 66.

PALEING. In plumbing, the soldering on of embossed figures on leaden work: the manner of doing which is described in NEVE, s. v. Lead, No. 12. 4.

PALENCIA (the ancient Pallantia). A city formerly belonging to the province of Leon, but now the capital of a province of the same name; situated on the river Carrion, over which are two bridges, with others in the neighbourhood. It is the see of a bishop. The cathedral (Gothic) dedicated to S. Antolin, is after the type of that at Leon; the first stone was laid 1 June 1321: and was 1504 undertaken by M. de Solorzano to be completed in six years, with stone from the quarries of Paredes del Monte and Fuentes de Valdepero; but dying in 1506, Juan de Ruesga finished it. The door into the cloister from the church is dated 1535, and the enclosure of the choir 1534. The nave is 36 ft. 8 ins. wide from centre to centre of the columns, and each aile 31 ft. 2 ins. The stalls, about 1410, were removed 1518-9 into a new choir. The iron gratings were made in the sixteenth century by C. Andino. There is a well in the hermit's cave in the crypt. Of the five parish churches, that of S. Miguel, 1190 to *cir.* 1250 (plan and view of steeple); and S. Francesco, 1246; both showing an Italian arrangement, are noticed in STREET, *Arch. of Spain*, 8vo., Lond., 1865, p. 56-64. There is also an episcopal palace; many convents; the hospital of S. Lazaro, formerly the palace of the Cid; a barrack for 500 horse and 1,500 infantry; a gallery of pictures; and a library. The university, founded in the tenth century, was 1239 removed to Salamanca. MIÑANO, *Diccionario Geog.*, vi. 14. 28. 50. 66. 96.

PALENCIA (C. DA); see ORTEGA (J. DE).

PALENCIA (maestro MARTIN DE), a native of Palencia, was appointed 1515 by the chapter of Salamanca, in conjunction with F. de Colonia of Burgos, to examine and report on the works of the cathedral of that city, which had been three years in hand. They found it was being built according to the plans made by the *maestros* under the contract arranged with Juan Gil de Hontañon, *maestro de la obra.* 66.

PALENQUE. The ruins near Otolum in Guatemala were the first which awakened attention to the existence of ancient cities in America. They are situated twelve or fifteen miles from Palenque (and so retain the name), in the state of Chiapas, and in the locality are called *las casas de piedra*, or the houses of stone; they are enclosed in a square space of about one thousand yards. The so-called palace is the principal structure; the front facing the east, is 228 ft. long, 180 ft. deep, and 25 ft. high, and has a bold projecting cornice. It stands on an artificial mound 40 ft. high, 310 ft. in front and rear, and 260 ft. on the sides: the front and rear had each 14 doorways, and the ends had 11; each opening is 9 ft. wide, the piers between 6 and 7 ft. It was of stone, stuccoed and painted, with bas-reliefs on the piers and borders of hieroglyphics. There were three chief court-yards within it. Another elevated pyramidal mound has a stone *casa* or temple on the top 76 ft. by 25 ft., with doorways and piers still standing: in the interior are two corridors, the ceilings formed of overlapping stones; etc. There are two other *casas* on their mounds, and two others very much dilapidated.

The ruins were first noticed 3 May 1787 by A. del RIO, but his narrative *Description of the Ruins*, etc., *translated from the original MS.; with a History of the Americans*, by P. F. Cabrera, 4to., Lond, 1822, obtained no attention. DUPAIX rediscovered the ruins 1805-7; copies of the drawings made by L. Casteñeda, draughtsman to that expedition, are in the British Museum, Add. MS. 15,502. His account, together with Col. Galindo's communications 1836 to the Geographical Society of Paris, are published by Lord KINGSBOROUGH, *Mexican Antiquities*, fol., Lond., 1830-48. BULLOCK, *Six Months in Mexico*, 8vo., Lond., 1825, ii, 68, noticed them. FOREIGN QUARTERLY REVIEW, Oct. 1836, xviii, 35. WALDECK, *Voyage Pitt. d'Yucatan*, fol., Paris, 1838. STEPHENS, *Central America*, 8vo., New York 1841, ii, 289-357, gives careful plans, etc., and outlines of the bas-reliefs, etc. NORMAN, *Yucatan*, 8vo., New York, 1843, p. 284-92; 295. CATHERWOOD, *Central America*, fol., Lond., 1844, pl. 6 and 7. CHARNAY, *Cités et Ruines Américaines* (photos), 8vo. and fol., Paris, 1862-3. BRASSEUR DE BOURBOURG, *Recherches sur les ruines de Palenqué et sur les origines de la civilisation du Mexique*, 4to., Paris (1866); and his *Mons. Anciens du Mexique et du Yucatan*, etc., views by Waldeck, fol., 1860. MEXICAN ANTIQUITIES. CHICHEN-ITZA. COPAN.

PALERMO (the *Panormus* of the Romans). The capital of Sicily, situated on the northern coast of the island in the bay of the same name. The original Greco-Phœnician city became the *el Cassr* of the Arabs, and is now the centre of the modern city; which was the last in Sicily wrested from the Goths by Belisarius A.D. 535; it remained subject to Byzantium until 831, when it was taken by the Saracens; and in 1072 it was captured by Robert and Roger de Hauteville, who founded the Norman dynasty in Sicily. A Roman villa, "carefully protected", is mentioned in SMITH, *Assyrian Discov.*, 8vo., Lond., 1876, p. 19. The walls and some of the fifteen gates date from the thirteenth century, and certain bastions 1537-1650: the old fortress of Castellamare was partly destroyed after 1860. The porta Felice is said to be by Bramante (GIARDINA, p. 126), but was begun 1583, and continued 1602, and completed 1636 by G. P. Novelli, (GALLO, *Elogio*, 4to., Pal., 1830, p. 50): it is 45 ft. by 77 ft. high, the roadway 27 ft. wide. Porta Nuova, formerly Austriaca, 1584; the north-west side rebuilt 1668 by G. Guerci;

rebuilt by M. A. Buonarroti; and the upper part by P. Novelli; it was restored 1823-5; the entire height is 160 ft.; (HITTORFF; CUCCINIELLO). Porta di Castro 1620; and porta Montalto 1638, also deserve notice. Porta Sta. Agata retains its Pointed arch. GIARDINA, *Porte Antiche*, Pal., 1731. The two main streets were formed 1564 by the viceroy don Pedro di Toledo. The houses are built similar to those of Naples, having flat roofs and terraces. The earthquake of 3 March 1823 damaged many of the buildings. The piazza Vigliena or I Quattro Cantoni, 1609-20, by Giulio Lasso, is an octagon about 100 ft. diam., the buildings having three tiers of orders and statues. The piazza Pretoria has an elaborate fountain 433 ft. in circumference, and 42 ft. high, by F. Camilliani and A. Vagherino of Florence, it dates 1554 (HITTORFF). There are also a white marble column of the Composite order, nearly 100 ft. high, 1728 restored 1750, and again 1804; which supports a bronze figure of the Virgin: a bronze statue of Charles V, made 1630 by S. Livolsi da Susa after a design by M. Smiriglio, by both of whom a marble statue was executed 1661 of Philip IV with four slaves manacled; but the statue being destroyed 1848 was replaced by another by Nunzio Morelli, the reliefs, 1854, are by V. Villareale. Palermo contains in scattered parts, a large number of interesting remains of Saracenic and Gothic work, both of early and late date; doors, windows, and other details abound among the houses.

Palermo is the see of an archbishop. In 1852 there were 41 monasteries and 23 convents existing; in 1864 (*Handbook*) are mentioned 194 places of religious worship, 11 of which are parish churches. The cathedral or *il duomo*, dedicated to the Virgin, was built 1170-85 by Gautier of France: but of this edifice only the crypt, about 100 ft. long from north to south, and 32 ft. wide, a portion of the south end, and the east end, remain. The cupola and other parts, including the reconstruction of the interior (Corinthian), were effected 1781-1801 by F. Fuga. The plan is a Latin cross 346 ft. long and 138 ft. wide in the transepts externally, 112 ft. in the nave, and 74 ft. high to the roof. The façade, a rich specimen of Sicilian Pointed architecture, has two towers 1300-50 (SAINT NON, pl. 57): the grand portal dates 1352-59 (a capital, *Illustrations*, 1856-57; with another, 1857-58, from the east door); the four marble statues 1724-5 are by G. B. Ragusa; CHAPUY, *Moyen Age Pittoresque*, pl. 92; a sketch in WOODS, *Letters;* its porch in *Moyen Age Mont.*, pl. 35. The highly ornamented south porch dates 1450; the carved marble doorway within, 1420, is by Ant. Gambara. The tomb of Frederick II is given in D'AGINCOURT (Architecture), pl. 13. The crypt contains the sarcophagi of twenty-four archbishops (CUCCINIELLO). ANON., *Sepulcri ecclesiæ Cath. Palermi*, fol., n. d. CASANO, *Del Sotterraneo della Chiesa Catedrale di Pal.*, Pal., 1849. DANIELE, *I regali sepolcri del duomo di Palermo, riconosciuti ed illustri*, fol., Naples, 1784. DALY, *Revue Générale*, xv, pl. 33, gives the upper part of the side. ROSENGARTEN, *Die Architek.-Stylarten*, 8vo., Brauns., 1857, p. 217, gives the exterior of the apse; also given in GAILHABAUD, *Mons.*, 4to., Paris, 1842-52, iii. HITTORFF, and also CUCCINIELLO, illustrate the edifice. DI CHIARA, *Discorso istorico-critico sopra le Chiese Maggiore e Catt. a Dio, etc.*, Pal., 1825.

Among the many churches the following have some points of interest;—Sta. Anna (Italian); S. Benedetto di Monte Oliveto (Corinthian), has an early cloister; Oratorio del Rosario di S. Domenico (barrocco) 1568; De' Gesuiti, rebuilt 1615, the altar by Ant. Gagini; S. Giorgio; S. Giovanni l'Oroglione; Sta. Maria la Nuova or La Buona Nuova, rebuilt 1520; Sta. Maria del Cancelliere, originally Sta. Maria de' Latini, a Benedictine nunnery, rebuilt 1590, rich with gilding and colour; Sta. Maria la Pietà (*Illustrations*, 1857-58, s. v. Corbel); Sta. Maria di Valverde, or Sta. Lucia, Carmelite nunnery (*barrocco*), rebuilt 17th cent., is inlaid with marbles; S. Michele Arcangelo, has no part older than the 16th cent.; it contains inscriptions of Norman times; Monte Santo; Monte Vergine, rebuilt 1687, its tribune (Corinthian) is by one of the Marvuglia; S. Niccolò Tolentino of the Barefooted Augustine monks (Italian Doric) has a flat ceiling over the choir painted as a dome; Sta. Orsola; S. Pietro Martire is very small; Confraternità de' Pollajuoli is a chapel; Spedale de' Sacerdoti; S. Sebastiano; Sta. Teresa, a nunnery (Italian), *cir.* 1680 by Giac. Amato; and Sto. Vito.

Among the churches of interest are:—

S. Agostino; (Siculo Norman); the portal in the west front at close of 13th cent.; an exceedingly rich wheel window over it of twelve lights; interior modernised 1672.

Sant. Antonio; before 1220; west front is late Gothic; restored 1823. The plan is a Greek square surmounted by a cupola of early date. The campanile 1302-13, by G. and M. Chiaramonte, has been frequently restored; and in 1595 reduced in height; it contains the great bell hung in 1575.

S. Antonio di Padova; an oratory, attached to the palazzo de' Tribunali (Norman); the interior is Pointed, with an apse and groined roof.

Badia Nuova or Monte Oliveto; order of Sta. Chiara, founded 1512, restored 1758 (Italian); the frescoes in the roof by P. Novelli, *cir.* 1670.

S. Carlo of the Benedictines (Composite), 1616; plan elliptical with a cupola.

Carmine Maggiore (Italian rococo); by M. Smiriglio (died 1636).

Casa Professa of the Jesuits; (Italian Doric), consecrated 1636, the dome completed 1683. A large and richly adorned church.

S. Cataldo; (Siculo Norman) *cir.* 1160; is in nearly its original state; its plan is a Greek square, 34 ft. long by 24 ft. wide, with three apses: the nave and aisles are separated by Pointed arches; it has an opus Alexandrinum pavement; and three cupolas of equal height and dimensions, from which only it receives its light. It was repaired 1679. SERRADIFALCO, *Monreale*, pl. 25.

Sta. Caterina, Dominican nunnery; (Corinthian) 1566-96; it has a nave and transepts and a cupola, elaborately decorated in the *style barrocco*. The whole surface of the walls and side chapels is encrusted with the peculiar Palermo mosaics (not like Florentine). The choir pavement is Florentine mosaic work.

Sta. Chiara; 1344, but the marble decorations are later.

Church of the Padre Crociferi; *cir.* 1680 by Giac. Amato, octagonal with an elliptical cupola. In the monastery is a corkscrew staircase of 111 steps.

Sta. Cita; see Sta. Zita.

La Concezione; Benedictine nunnery (Italian *rococo*), small but highly decorated; the mosaic work similar to that in Sta. Caterina.

Chiesa de' Dispersi or Sta. Maria Annunziata; (Gothic) *cir.* 1345, it is small and has three apses and three aisles; with a flat coffered ceiling. The façade dates 1501 (Renaissance). Close to it is a fine Norman doorway *cir.* 1300 with a triple Norman zigzag.

S. Domenico; (Italian) 1640, by fra Andrea Cirrincione. Internally (Roman Doric) it is one of the largest in the city; 309 ft. 9 ins. Eng. long; and will hold nearly 12,000 persons exclusive of the choir. A plan is given in RONDELET, *L'Art de Bâtir*, fol., Paris, 1812, p. 230, pl. 88: HITTORFF. The cloisters (Norman) are small, and resemble those at Moureale; a capital is given in *Illustrations*, 1856-57.

S. Eulalia de' Catalani; *cir.* 1500; it assumed its plan of a Greek cross 1757.

S. Francesco d'Assisi; 1255-1471, the west door 1302 is of three orders with Pointed arch; the interior is of the Italian Ionic; five frescoes are by P. Novelli.

S. Francesca di Paola; see Sta. Oliva.

La Gancia, Gangia or Grangia, also known as Sta. Maria degli Angioli; about 1430, attributed to A. Gambara; but the flat wood ceiling having gilt stars in coffers belongs to the earlier church; the octagonal marble pulpit is by the elder Gagini.

S. Giacomo la Marina; before 1143, rebuilt 1723; interior modernised, with coloured marbles to the walls. A portion of the ancient campanile (of a former mosque) with a Pointed arch remains in the façade, and a side aile of two Pointed bays outside the present church. The marble font dates 1574. The holy water basins date, one 1460 by Bart. Dalechima, the other 1561.

S. Giovanni degli Eremiti; (early Norman), rebuilt by king Roger before 1132. It has five small cupolas with pendentives, and three apses. It is 56 ft. 9 in. long, 18 ft. 8 ins. wide internally, and lighted entirely by small windows between the pendentives. The walls are bare ashlar, stucco was probably never applied. The cloister is given in HITTORFF and ZANTH, pl. 74. D'AGINCOURT, (Architecture), pl. 73. CARINI, *Sul Monastero di S. Giov.*, in *Archivio Storico Siciliano*, Pal., 1873, i. It is now under restoration.

S. Giuseppe de' Teatini; (Italian) 1612-45, by Giac. Besio; is large and richly decorated in marbles. Its plan consists of three ailes, chapels, and a dome; the nave and ailes have 26 Composite columns, each 23 ft. 6 ins. high; the eight which support the dome are monoliths of grey marble, 34 ft. high exclusive of the capital and base, and 14 ft. in circumference: the archivolts and architraves are of yellow marble,

the frieze of red mottled marble, and the cornice is gilt. The frescoes in the vaulting are by Filippo Tancredi (1655-1725). Beneath is a crypt hollowed in the rock, called La Madonna della Provvidenza, and of the same dimensions as the church; the principal chapel is one of the richest in Palermo, with Italian decorations. Hittorff. Rondelet, iii, 230-2.

S. Ignazio Martire; see L'Olivella.

S. Lorenzo; 1564, the walls encrusted with statues and reliefs in stucco by Giacomo Serpotta (1655-1732). The benches are of ebony inlaid with ivory and mother of pearl, and supported by carved wood figures.

La Magione, originally Sta. Trinità, of the Cistercians; built before the middle of 12th century, was granted 1193 to the Teutonic Knights Hospitallers, hence called *mansio*. Since 1787 it has been associated with the Constantinian order of S. George. It stands in a large court; the Doric façade with open belfry 1820-3. The interior is about 110 ft. long by 44 ft. wide, with three ailes and three apses; the dome of the choir has been replaced by wagon vaulting; the nave has a similar roof, but above it the ancient flat ceiling of wood, carved and gilt, is said to exist. The cloisters, apparently of the same date as the church, are blocked up.

Sta. Maria Annunziata; see Chiesa de' Dispersi.

Sta. Maria dell' Ammiraglio; see La Martorana.

Sta. Maria degli Angioli; see La Gancia.

Sta. Maria della Catena, also called Parrochia della Kalsa; 1391; the west front and portico rebuilt *cir.* 1590 by the sons of Gagini; it consists of three ailes, transepts, and three apses; the roofs of the apses and nave are groined: (Hittorff; the façade in Cucciniello).

Sta. Maria delle Grazie; see Le Ripentite.

Sta. Maria dello Spasimo, Olivetan monks; 1560 (Northern Pointed style), is now in ruins, and the monastery serves as a hospital.

La Martorana, also called S. Maria dell' Ammiraglio, and more commonly S. Simone; (Norman), *cir.* 1101, 1113, or after 1139, completed 1143. A square Greek plan with three apses, and a cupola supported by columns; its former outline, marked by the original pavement of opus Alexandrinum work, measures 39 ft. by 34 ft, exclusive of the apses. The walls, cupola, and apses, were originally entirely encrusted with mosaics on a gold ground. In 1590 the west wall was pulled down to enlarge the choir; when two of the internal mosaics were removed and preserved. In 1685 the middle apse was replaced by a quadrangular chapel (*rococo*). The church was then extended to the west till it reached the original square Saracenic campanile (of four stories, the two upper ones 14th cent.; its cupola was removed 1726), which originally stood 55 ft. distant from the Norman church, proving the existence of an atrium in front of it. It is probable that all the columns beyond those which support the cupola once stood in the atrium. The small cupola is original externally: the north door dates 1591, altered 1737. Gailhabaud, *Mons.*, 4to., Lond., 1842-52, iii, 3 pl.: *Moyen Age Pittoresque*, pl. 56. Cucciniello. Riola and Terza, *Descr. della porta Arabo-Normanna della Martorana*, 4to., Pal., 1871. Serradifalco, *Monreale*, pl. 23-4.

S. Matteo and Il Purgatorio; (Italian Doric), 1662, the interior has columns of grey marble, and the walls lined with yellow and red marbles: (Hittorff).

Monte Oliveto; see Badia Nuova; and S. Benedetto.

S. Nicolò l'Albergaria; founded 1409 by queen Bianca, but only its campanile remains, having Pointed windows with mosaics in lava and white stone, and string courses in mosaic and in relief.

S. Nicolò della Kalsa, having a Norman tower with inlaid work, probably of the twelfth century, is referred to in Woods.

L'Olivella or S. Ignazio Martire; (Italian) 1598-1608 by Antonino Mattone; the lofty dome 1732 is covered with bright green tiling; the piers are faced with yellow and purple marble. In the monastery is a library of 22,000 volumes. The façade of the house of the padri Filippini is by P. Novelli.

Oratorio dell' Olivella adjoining the above; (Italian) 1769, by G. V. Marvuglia, and considered his *chef d'œuvre;* it is small, with Corinthian columns of grey Sciacca marble carrying a vaulted roof (Hittorff).

Parrochia della Kalsa; see Sta. Maria della Catena.

La Pietà, Dominican nunnery; (Italian), 1680 by G. Amato. The convent was formerly the palazzo Patella (which see).

Le Ripentite, formerly Sta. Maria delle Grazie; founded 1512, has a front in the northern Pointed style; interior modernised.

Oratorio del Rosario di Sta Cita; see Sta. Zita.

S. Salvadore; the convent 10...-1148, of which vestiges exist in the west wall having seven Pointed windows and a door. The church (*barrocco*) built 1682-1706 by P. Amato, is a very large octagon on plan, with an elliptical dome. The pavement is of Florentine mosaic; and the walls inlaid with marbles.

S. Simone; see La Martorana.

Sta. Trinità; see La Magione.

Le Vergini, Benedictine nunnery; 1451.

Sta. Zita or Cita, of the Dominicans; (Italian Doric), founded 1586; a spacious interior with a sham dome. The Oratorio del Rosario di S. Cita, on the first floor of the convent, is one of the most decorated oratorios in the city, in the *barrocco* style in stucco work, with a host of statues by G. Serpetta (1655-1732). The pavement is formed in geometric patterns, and the seats inlaid with mother of pearl.

Plans of many early churches in Sicily are given with S. Giacomo La Mazara, and S. Pietro la Bagnara, on pl. 26 of Serradifalco, *Monreale*, fol., Pal., 1838, also pl. 27 and 28.

The cemeteries are among the places outside the city.

Among the public edifices, the following are worthy of notice: The *palazzo reale*, "a huge misshapen mass of buildings and towers of various styles and epochs" (Knight), was founded about the middle of the 9th cent. by the Saracens; only one tower, that of Sta. Ninfa, remains; this with the cappella Palatina and a portion facing the west is nearly all that remains of Norman construction: it became the seat of the inquisition, until 1553, when it was again made the vice-regal residence. The central part containing the royal apartments was built 1600, and the whole then assumed the present form of a palace of Doric architecture of three stories. The grand staircase of red marble was built 1738 for Charles III; on the ground floor are three halls for the Sicilian Parliament, which were afterwards used for the public archives, and since 1799 as stables. The *cappella Palatina*, dedicated to S. Peter, on the first floor, is in complete preservation, and a most interesting specimen of the mixture of the Romanesque, Greek, and Saracenic styles (Gally Knight). It was erected before 1132 by Roger, first king of Sicily; the mosaics are of 1143 and by king William I; various dates, as 1340, record additions and restorations. It has a nave, ailes, and three apses, with a choir or upper end of a Greek square, with a cupola; and is 86½ ft., or 101 ft. long with the apse, and 40 ft. 4 ins. wide; the columns supporting the five arches on each side up to the choir, are about 15 ft. high, alternately of Egyptian granite, cippolino, or white marble. For about 10 ft. high the mosaic on the walls is opus Græcanicum and Saracenic; above up to the roof is opus musivum and Byzantine; all on a gold ground: white, blue, brown, and purple, are the prevailing colours. The pavement is opus Alexandrinum. The nave ceiling is coffered and coloured. The choir is separated from the nave by a pierced marble cancellum inlaid with mosaics. The hemispherical cupola, which rises to the height of 55 ft. 6 ins. from the pavement, is lighted by eight small windows. The ambo or pulpit of white marble, supported by marble columns, is about 12 ft. square, and covered with mosaics. A richly carved white marble candelabrum 14 ft. high, of Byzantine art, is perhaps of older date than the chapel. The south door is of walnut wood with arabesque carvings of modern date. The side entrance has a bronze door of the twelfth century. A wood door, covered with carvings of birds, animals, etc., entwined in foliage, *cir.* 1200-50, from the Norman palace, is given in *Illustrations*, 1858-59. At the west end is the throne almost filling the nave; it is of white marble raised on five steps, and covered with opus Græcanicum. The crypt, on the ground floor of the palace, corresponding in plan with the chapel, is perhaps of Norman date. The walls of the portico of six arches were covered 1506 with mosaics, which having decayed were replaced 1800 by Santo Cardini, who took 37 years to complete them. The *archivio* is entered from the sacristy; the door is of iron, curiously grated; it is of early date, and once formed the grating to the window in the central apse now blocked up. Pirri, *Notitia Regiæ, Capellæ S. Petri*, fol., 1716. Chiara, *De Capella Regis*, fol., 1815. D'Agincourt (Architecture), pl. 46: Hittorff, pl. 45-8; and Cucciniello. *Chapelle Palatine*, Gailhabaud, *Mons.*, 4to., Paris, 1852, iii, 3 pl. Daly, *Revue Gen.*, 4to., Paris, 1841, ii, 275; iii, 61, and plate; xv, 247, pl. 23. Terzi, *La capella di S. Pietro nella Reggia di Pal.*, described by Cavalli, Meli and Carini, fol., Naples, 1872; and Pal., 1875. Serradifalco, *Monreale*, fol., Pal., 1838, pl. 15-17. *Tabularium regiæ ac imperialis capellæ, etc.*, fol., Pal., 1835. On the upper story is the *sala de' Vicerè;* and the *sala de' Venti*, a square hall (Norman), covered with painted imitations of mosaic; this is

within the torre di Sta. Ninfa; as is also the *sala Normanna* adjoining, square and smaller than the last, the walls covered with mosaics on a gold ground of the time of William I, above are slabs of white marble 12 ft. high; (*Illustrations*, 1857-58, s.v. Ceiling): the floor is tesselated in imitation of the original pavement. Then follows the *sala del Parlamento* (à la Louis XIV); the *sala dell' Udienza*, decorated with arabesques; and the suite of apartments used by royalty. On the summit of the Norman tower is the *specola* or observatory erected 1791.

The *palazzo arcivescovale* was rebuilt 1458-60, but there only remains of that period a large Pointed window near the eastern angle, and the entrance gateway. The large window at the east angle, with its massive stone balcony supported by cantilevers terminating in heads, said to be portraits of the Gagini family, who constructed it *cir.* 1590, as described in the *Handbook*, 1864, p. 66. The campanile is united to the cathedral by two lofty pointed arches across the street; the two lower stories about 80 or 100 ft. high are Norman; the upper part is a modern restoration corresponding with the higher stories of the cathedral towers adjoining it. *Palazzo de' Tribunali* (Siculo-Norman) was built 1307-20 for Manfred Chiaramonte, count of Modica. It has a large court in the centre; a battlemented tower at one angle has three stories: the original entrance has been modernised. The ground floor is now the *dogana;* in 1799 the legal tribunals (removed 1600) were replaced here on the upper floor, where one of the antechambers has a timber ceiling painted and dated 1380 (GAILHABAUD, *Arch. du Vme.*, 4to., Paris, 1854, iii. 3 plates; DALY, *Revue Générale*, 4to., Paris, 1858, xvi, p. 259, pl. 48): the attics contain the archives. *Regia università degli Studj*, or the museum, was built 1806; it contains a library of nearly 30,000 volumes, antiquities, pictures, natural history, a fine anatomical theatre; schools and chemical laboratory. The *museo Nationale* is now located in the suppressed monastery formerly occupied by the Filippini, with new sculpture galleries recently erected. It contains the collection of ancient sculpture, among which are ten metopes from the three temples at Selinus. The first three, dating *cir.* 628 or 650 B.C., are the oldest existing Greek sculptures except perhaps the lions over the gate of Mycenæ; two, *cir.* latter half of the sixth century; and five about the first half of the fifth century before Christ, are all of sandstone resembling tufo, probably obtained from Menfrici near Selinus, which quarries are still worked. *Regia zecca* or mint, 1699, since 1816 used as the excise office. *Palazzo Senatorio* or town hall, founded 1300-1470, but entirely altered; it is a quadrangle; the gate was enlarged 1691. *Palazzo delle reali Finanze*, formed part of the old *Vicaria* founded 1578 as a custom house, but 1595-1840 used for the tribunals of justice and prisons, the building having been modernised by Emmanuel Palazzotto with an interior court meant as an exchange.

P. Campofranco is now the British consulate, late Sicilian Gothic, close of 15th cent., but greatly restored. P. Cattolica, Gothic but modernised: the arcaded interior court should be noticed: HITTORFF, who also gives P. Comitino, Cuto, and Constantino. P. del conte Federigo, with the ancient torre di Busuemi; the upper floor has a large Pointed window with mosaics. P. Geraci (Italian), has a Doric cortile, staircase, portico, and vestibule *cir.* 1770, by G. V. Marvuglia (HITTORFF). P. di S. Matteo (Norman), has a series of Pointed windows and a richly foliated string course: it is now occupied by the lowest orders of people. P. Paternò, also P. Moncada, and P. Ajutamicristo 1485, were altered at various periods (transition Sicilian style, depressed or ogee arches being used). P. Raffadali (Sicilian Gothic). P. Valguarnera, has a good double staircase in the cortile. The palace of the Consulate of France, *cir.* 1830, is given in HITTORFF. Some of the other palaces are used as public offices, etc.

Libreria del Comune, 1822, has a Doric portico; the library on the upper floor consists of 75,000 vols. and 2,000 MSS. in walnut wood cases. *Edificio del Lotto;* a small modern pavilion of Doric architecture. *Monte di Pietà*, 1591, is a large pile with a Doric portico. *Collegio Massimo* now the *liceo*, 1588, encloses a court with a double arcade: on the first floor is the library, a room containing 40,000 volumes: on the upper floor the museo Salnitrano, founded 1730, of natural history, Greek, Roman, and Saracenic antiquities, and works of art. *Conservatorio di Sto. Spirito* or foundling hospital, transferred here 1756; it has a spacious court with an arcade of 28 columns of grey stone, with a fountain in the centre. *Spedale grande* 1330 (late Pointed), was originally the palace of Matteo Sclafani, count of Aderno, and erected in one year, so large as to hold in the court the vast pal. Chiaramonte. In 1440 it was purchased for a sick and poor hospital, and lately served as barracks. It had three stories, all with flat decoration. The door within the north vestibule with a Pointed arch of three orders, is "one of the earliest specimens of the appearance in Sicily of the Pointed style of the North" (*Handbook*), but it dates perhaps 1433. The spacious court has a Doric arcade to the ground floor, and one of Pointed arches over. *Spedale incurabili;* its plan is given in LECLERE, *Recueil*, fol., Paris, 1825, pl. 8. The teatro Bellini, rebuilt 1809 by — Puglia, is the largest, and has five tiers of boxes. T. di Sta. Cecilia, 1692, of elliptical form, has 4 tiers of boxes; T. di Sta. Anna is small; there are four others: a *concours* for a new one 1864-5 is described in DALY, *Revue*, xxii, and xxiii. The teatrino di Musica 1856 is by M. A. Fichera.

Outside the walls and in the environs the following places deserve attention. In the Port (given in CUCCINIELLO), is the *Vicaria*, or *Grandi Prigioni* for 1800 prisoners, 1834-40, by Di Martino, on the model of the Philadelphia penitentiary. The mole, nearly a quarter of a mile long, was designed 1567-90 by Mariano Smiriglio; the lighthouse at the end dates 1593; the whole cost nearly a million sterling. Arsenal, 1630, by M. Smiriglio, is of stone on four large arches intended for slips, but now used for naval stores; the upper floor has a prison for galley slaves. Long lines of barracks raised by Philip IV (1621-65). *Reale casa di Correzione.* The lazzaretto, 1628, restored and enlarged 1833; within its walls is the Protestant cemetery. *Casa de' Matti* or lunatic asylum, 1825, on the plan of an old Roman villa, by the baron Pietro Pisani (died 1837 aged 73), said also to be taken from the asylum at Aversa. *Albergo de' Poveri*, 1746-72 by N. Palma or Orazio Fioretto; contains a church, several courtyards, and a garden; the façade is 500 ft. long; (HITTORFF). *Istituto Agrario Castelnuovo*, 1847 by Antonino Gentile "to Sicilian agriculture", has a chapel and museum attached. *La Flora* or *Villa Giulia*, 1775 by Nicola Palma, is about 720 ft. square. *Orto Botanico*, is 810 ft. by 270 ft.; the museum (Doric) before 1794 is by L. Dufourny of Paris. *Ponte dell' Ammiraglio* (Norman) 1113, over the former bed of the river Oreto, has six plain pointed arches, each with a double row of voussoirs; the chief arch is nearly 31 ft. wide, and more than 20 ft. high; in each abutment is a small narrow arch assisting the escape of the torrents; (CUCCINIELLO).

La Cuba, a lofty square yellow tower, used as cavalry barracks: some honeycomb work in a recess in the court, and in a chamber on the upper floor, are the only traces of the Saracenic style. The front is given in ROSENGARTEN, p. 175. G. DE PRANGEY, p. 78-88: and by HITTORFF. Beyond it is *La Cubola*, a low square stone tower, with an open arch on each side, and surmounted by a cupola, hardly 30 ft. in height; "it is perhaps the most genuine relic of Saracenic architecture around Palermo" (*Handbook*, 1864). *La Ziza* or *Zisa*, a lofty square tower of stone in three stories, is considered to have been built as a voluptuous retreat by the Saracenic princes, and with its gorgeous decorations of marble, porphyry, and mosaic work, surpassed in splendour all the royal palaces of Italy of the sixteenth century. Being greatly altered by king William I, he is said by some writers to have built it. It is now used as a residence. The square interior hall has a deep alcove on each side with the usual honeycomb work: in one is a fountain which gushes from

the wall and flows in a channel along the pavement, a Norman innovation. Above it are some mosaics, almost the counterparts of those in the palazzo reale. It was repaired 1636. Some honeycomb vaultings to the recesses of the windows on the upper floors now only remain. The roof is flat and is reached by 116 steps. Leandro ALBERTI, *Descr. di tutti Italia*, fol., Bol., 1550, described 1526 the garden, fishpond, etc., of which only slight remains now exist; (G. DI PRANGEY, pl. 78; HITTORFF; CUCCINIELLO; and HOUEL, pl. 31). *La Favorita*, a villa built for king Ferdinand III, 1798-1806, in the Chinese style; (SMIRKE). *Mar Dolce* or *La Favára*, consists of the remains of a Saracenic palace, erected before 1172, and perhaps repaired by king Roger, who added the chapel, which is almost a miniature of S. Giovanni de' Leprosi (noticed below), but without ailes. To the north are the remains of vapour baths. At Santo Ciro are three large arches faced with long bricks, probably a naumachium or a nymphæum of the Roman period. Villa Filippina is a large quadrangular garden enclosed by high walls and surrounded by an arcade supporting a terrace used as a promenade; the walls covered with frescoes. The casino Belmonte, now Riso, is by G. V. Marvuglia, *cir.* 1780, having a double portico (HITTORFF). "Palais de la Guadagna" (Gothic), about 20 ft. by 67 ft. long inside, of which a plan, elevation, and detail of a window, are given in DALY, *Revue Générale*, 1854, xii, 115, pl. 14.

The small church of S. Giovanni de' Leprosi, 1072, has three ailes and apses and a cupola. The small Franciscan church of Sta. Maria di Gesú, 1426 (Pointed style of Northern Europe), and its cloisters; (interior of convent in CUCCINIELLO). The cemetery of *Santo Spirito* consists of a square enclosure with deep pits arranged in rows, one pit used to be opened every day in the year as at Naples, but they have remained closed since 1837. Within the enclosure is the Norman church, much modernised, of the Holy Ghost, which with a Cistercian monastery adjoining was founded 1173. In the court are long galleries full of desiccated dressed up corpses. The church of Sta. Teresa of the Barefooted Carmelites, is of the seventeenth century. L'Addolorata, is the parish church of La Zisa; the sacristy was a chapel of Norman times. L'Annunziata, a church of the Franciscan monastery, has a red dome. Santa Oliva, belonging to the Minorite friars of S. Francesco di Paola, founded 1518, has two fine monuments 1546 and 1607. The convento de' Cappuccini, beyond La Cuba, has a great number of underground vaulted galleries, having niches cut in the walls, in which stand dead male bodies (not skeletons) in their special costume as when living; some are three centuries old; it is described by P. E. BOTTA: MAGASIN PITTORESQUE, i, 316. Le Catacombe, a subterranean cemetery discovered 1785, is the only relic of the classic days of Palermo; it is supposed to be of Christian origin. The grotto or hermitage of Sta. Rosalia on monte Pellegrino, where her bones were discovered 15 July 1624; it contains a statue of her by Gregorio Tedeschi; the robe is said to be of beaten gold, the gift 1748 of Charles III; (CUCCINIELLO; PENNY MAGAZINE, 1836, v, 444; SAINT NON). On the highest peak of the hill, 1963 Eng. ft. above the sea, is one of the ancient beacon towers erected along the coast. The colossal statue of Sta. Rosalia serves as a landmark; it was restored after having been shattered by lightning in 1841.

MONREALE; the monastery of S. Martino by Ign. Marabita, 18th cent. (CUCCINIELLO); Baida; SEGESTE; the castello di Maredolce (CUCCINIELLO); the casino of prince Palagonia (HOUEL, pl. 31); Bagheria (pal. Cuto in HITTORFF); Capo Zafferano in CUCCINIELLO); and SOLUNTO; are other places in the neighbourhood. 28. 96.

FAZELLUS, *De rebus Siculis*, fol., Pal., 1558; and *Storia di Sicilia*, new edit., 12mo., Pal., 1830-36. PIRRI, *Annales Panormi*, 8vo., 1869; *Siciliæ Sacræ*, fol., 1735; *Not. Siciliensium Ecclesiarum*, 4to., Pal., 1630-33: *Sicilia Sacra*, etc., 4to., Pal., 1644-33-1734. AURIA, *Il Gagino Redivivo*, 8vo., 1698. INVEGES, *Annali della Città di Pal.*, 3 vols., fol., 1645-51. VALGUARNERA, *Discorso sull' Origine e Antichità di Pal.* MORSO, *Descr. di Palermo Antico*, 8vo., Pal., 1827. SERRISTORI, *Statistica d'Italia*, 1836. SCHUBRING, *Historische Topographie von Panormus*, Lubeck, 1870. SCINA, *Topografia della citta di Pal.*, 1818. PARUTA, *Sicilia con medaglie*, fol.

HAGER, *Gemälde von Pal.*, 8vo., Berlin, 1799; transl. by Mary Robinson, 12mo., Lond., 1800. *Guida Istruttiva della citta di Pal.*, 12mo., Pal., 1816. PIOLA, *Diz. delle Strade di Pal.* ZERMAN, *Guido Almanacco letteraria, scientifica, etc., della città di Pal.*, 1875. SALVO and LANZA, *Pal. e dintorni*, 24mo., Pal., 1875. DI MARZO FENO, *Guida istruttiva per Pal.*, 16mo., Pal., 1858. *Palermo; il suo passato, il suo presente, i suoi monumenti*, 16mo., Pal., 1875. DI GIOVANNI, *Del Pal. restaurato*, in DI MARZO, *Bibliotcca Storica, etc., di Sicilia*, Pal., 1872, x and xi. MARCHESE DI VILLABIANCA, *Il Pal. d'oggigiorno*, in the same work, xiii, xiv, and xvi, Pal., 1872-75, contains the most ample details on the city. MORTELLARA, *Guida di Pal.* G. PALERMO, *Guida Descr. di Pal.* DE DOMINICI, *Vite dei P., S., ed Arch. Napoletani*, 8vo., Nap., 1846.

PLACA, *La Reggia in Trionfo per—coronazione della—Carlo, etc.*, fol., Pal., 1736. GOLDICUTT, *Antiq. of Sicily, etc.*, fol., Lond., 1819. S. NON, *Voy. Pitt. de Naples, etc.*, fol., Paris, 1781-6, iv, 137-156. HUGHES, *Travels in Sicily*, 8vo., Lond., 1830, i. CASANO, *Memorie Sotteranco della Culte de Pal.*, 4to., 1849. GIRAULT DE PRANGEY, *Essai sur l'Arch. des Arabes*, 8vo., Paris, 1841. ALLAN, *Pict. Tour in the Mediterranean*, fol., Lond., 1843, p. 89. SMIRKE, *Recollections of Sicily*, read at the Roy. Inst. of Brit. Architects, 1860-61; reprinted in BUILDER *Journal*, xviii, 715; 730. BARTLETT, *Pictures from Sicily*, 8vo., Lond., 1853. HOUEL, *Voy. Pitt. des îles de Sicile, etc.*, fol., Paris, 1782-89, i. SCINA, *Topografia de Pal. e suoi Contorni*, 8vo., 1818. KNIGHT, *Normans in Sicily*, 12mo., Lond., 1838. DI MARZO, *Storia delle belle Arti in Sicilia, dei Normanni sino alla fine del secolo xiv.* SPRINGER, *Mittelalterliche Kunst in Pal.*, Bonn, 1869. WOODS, *Letters*, 4to., Lond., 1828, ii, 336-41. CUCCINIELLO e BIANCHI, *Viaggio Pittorico*, fol., Naples, n. d., iii, p. 2-87, and HITTORFF et ZANTH, *Arch. Moderne de la Sicile*, fol., Paris, 1835, p. 43-53, both give many views of the buildings, etc., as noted in the text. BOURQUELOT, *Voyage en Sicile*, 18mo., Paris, 1838. DE LUYNES and HUILLARD BRÉHOLLES, *Monts. des Normands dans l'Italie Méridionale*, fol., Paris, 1843. WYATT, *Mosaics*, fol., London, 1848. LOCKYER, *Original Drawings of Mosaics at Palermo and Monreale*, 1840, now in the library of the Royal Institute of British Architects. (MOSAIC WORK.) ZAHN, *Ornamente aller Klassichen Kunst Epochen*, fol., Berl., 1863. LEWIS, *Researches on Colour and Coloured decoration*, in *Sessional Papers*, Royal Inst. of Brit. Archts., Nov. 1862.

PALERMO (fra GIOVANNI DA), living in the seventeenth century, restored the church of the Dominicans in Sanseverino; MARCHESE, *Lives*, 8vo., Dublin, 1852, ii, 325.

PALESTRINA (the ancient PRÆNESTE). A town in Central Italy, situated twenty-seven miles from Rome, reached by the via Prenestina. It was one of the most ancient Greek cities of Italy, and the residence of a king before the foundation of Rome. "The ruins of the walls exhibit the polygonal masses of Pelasgic masonry; the smaller polygonal work of a later period when the Pelasgic style was imitated in those districts where limestone was used; the quadrilateral massive substructions of the age of Sylla and of the later times of the republic; and the brickwork or *opus latericia* of the imperial times" (*Handbook*). The city was frequently the residence of the emperors Augustus, Tiberius, Nero, and Domitian; and Hadrian built a magnificent villa in its vicinity, considerable remains of which are still visible. The temple of Fortune, for which the place was celebrated in ancient times, must have been of great extent. It was built in terraces up the slope of the hill; and was restored by Sylla after his destruction of the city: the best preserved portion is in the piazza Tonda, consisting on the outside of four Corinthian semi-columns, and within of a large hall flanked with Corinthian pilasters, and having a tribune or semi-circular

recess in which the celebrated mosaic pavement was discovered. CANINA considers it to be the eastern one of two ailes on the second terrace; the semi-circular portico which formed the uppermost terrace is on the front of the modern palace, above which rose the temple, and at a higher point the scene of the *sortes prænestinæ*, described by CICERO, *De Divinatione*, ii, 41. Fragments of inscriptions and statues discovered among the ruins are preserved in the modern palace, particularly the mosaic pavement, which is placed on the first floor. It is supposed to be of the time of Hadrian, perhaps the finest and most perfect ancient mosaic in existence (LITHOSTROTUM OPUS); it was found 1640, and was removed by P. Berretini da Cortona; it has been recently restored. The subject has been commented upon by KIRCHER, *Latium*, fol., Rome, 1669; Cardinal de POLIGNAC; CECCONI, *Storia di Pal.*, Ascoli, 1756; VOLPI, *Vetus Latium*, 4to., Rome; MONTFAUCON, *L'Antiquité expliquée*, fol., Paris, 1719-24; WINCKELMANN; abbé BARTHELEMY, *Explication de la mosaïque de Palestrine*, 4to., Paris, 1760; SPRETI, *Arte de' mosaici*, p. 33; CECCONI, *Del pavimento*, Rome, 1827; FEA, *L'Egitto conquisato*, Rome, 1827; *Aggiunta all' opuscolo del pavimento in mosaico*, etc., Rome, 1828; CHAPY; and CECCONI, *Diss. sopra la basilica Emilia e Fulvia Prenestina*, Rome, 1840: while CAYLUS, F. CESI, CIAMPINI, C. DATI, and PETRINI, have illustrated it. The subject is now considered to represent a popular fête at the inundation of the river Nile: the names of the animals are given in Greek characters. A fragment of an Egyptian obelisk found here is now in the museum at Naples.

Among the many drawings by A. Palladio in the possession of the duke of Devonshire at Chiswick, are ten made probably about 1540, comprising the temple, with plans, etc., a restored elevation, elaborate measurements, and restorations of parts, with dimensions, showing some remarkable and interesting details, of which there are now no vestiges at Palestrina: as noticed by Poynter and Donaldson in *Collection of Arch. Drawings, etc.*, read at Royal Inst. of Brit. Archts., 17 Nov. 1845. SUARESIUS, *Prænestæ Antiquæ*, fol., Rome, 1655; with plans of the temple and town. BLAEU, *Nouveau Théâtre, etc.*, fol., Amst., 1704, ii. ROLANDI, *Pal. ex Mont. Vet. Illust.*, 4to., Rome, 1714. Signor Colonna and G. Hadfield made 1791 drawings from their measurements for a restoration of the temple, of which ten are now in the collection of the Royal Institute of British Architects; they comprise a plan and elevation of a design for the restoration of the Temple; two views of the town with remains of the ancient buildings; a view of the exterior of the Colonna palace, with some of the ancient remains; and three coloured views of interiors, presented by J. W. Papworth, 1848, who read a detailed description of the edifice, its remains, and the theories of the several restorers. The tradition of the arrangements, somewhat similar to the idea of Suaresius, are perpetuated in the two perspective elevations (No. 3439 of the Codices of the Vatican) which once belonged to Fulvio Orsini; by P. Ligorio, corrected by P. da Cortona; and CANINA, *Archit. Antiq. Romana*, fol., 1843, pl. 62-3, who notices the restoration by Constantin Thon, published in five plates by NIBBY, Rome, 1825. PETRINI, *Memorie Prenestine*, Rome, 1795. NIBBY, *Dintorni*, ii, 494-510; and *Viaggio Antiquario*, 8vo., Rome, 1819, p. 294-8; and *Il tempio della Fortuna Prenestese*, fol., Rome, 1825. J. N. Huyot made 1807 a restoration while at Rome, treating it as a vast thermal establishment, with basilica, forum, etc.; the drawings are now in the école des beaux arts at Paris: the plan of this restoration, corrected by T. L. Donaldson on the spot, is also in the Inst. of Brit. Archts.

The history of Palestrina during the middle ages is associated with the family of Colonna, who obtained it 1043; the citadel was on the summit of the hill 2152 ft. above the sea level. In 1300 the fortifications with all the buildings were razed to the ground except the cathedral, dedicated to S. Agapito martire (restored, etc., 1702 by Sebastiani), and the inhabitants compelled to build a new town near the church of the Madonna dell' Aquila. In 1307-11 the city rose again; the castle was completed 1332 according to the inscription over the gate: it was captured 1436, in the following year razed nearly to the ground, and in 1438 the citadel, now called castel di S. Pietro, was nearly destroyed. After a time the inhabitants collected around the old baronial palace, and in 1448 the Colonna family rebuilt the city half way up the slope of the hill, with the walls and towers as now seen. The city was sold 1630 to the Barberini family for 775,000 scudi. The church of S. Peter in the citadel was erected in the seventeenth century, on the site of a pre-existing one of the time of Gregory the Great, and restored 1730-2 by Michetti. No modern buildings of any interest now exist except the Barberini palace of the 17th century, now almost deserted; it is built on the foundations of the hemicycle that stood before the Sacrarium of the goddess Fortuna: it contains the antiquities above-mentioned, and a large hall covered with frescoes attributed to the Zuccheris. The church of Sta. Rosalia contains some tombs of the two families.

At a short distance below the town, near the church of the Madonna dell' Aquila, is placed the site of the forum erected by Tiberius and the Roman municipium. About a mile further are the ruins of the extensive villa of Hadrian, enlarged by Antoninus Pius; they give name to the church of Sta. Maria della Villa, and cover the surface for nearly three-quarters of a mile: many other fragments of villas, etc., abound. The fine fragment of the ancient road which connected the via Prænestina with the via Labicana is paved with massive polygonal blocks of lava, and is still perfect for a considerable distance. GARRUCCI, *Discovery of Sepulchral Remains at Veii and Prænestе*, in *Archæologia*, xli, 187-206, read May 1866, describes several tombs and their precious contents, discovered in late years The sepulchre found 1877 at Palma Nuova in the plain at the foot of the hill is supposed to date between 600 and 400 B.C.: it was about 6 ft. 6 ins. below the ground, and is about 17 ft. by 13 ft. wide; the walls lined with slabs of tufa; the articles in it, Egyptian and Assyrian in character, and of unparalleled splendour, are described in THE TIMES *Newspaper* of 17 Feb. 1877: they are now deposited in the museum of the Capitol at Rome. 14. 25. 28. 96.

PALIARI (ANTONIO), also called Marcò, and Ant. da Marchò in MAGRINI, was a native of Udine, restored the ducal palace at Venice after 1577; and was one of those who recommended 6 Jan. 1587 one arch for the bridge of the Rialto. Ant. di Mario was a *muratore* at the church of S. Giorgio designed by Palladio, and has been considered the same person. TEMANZA, *Vite*, 4to., Ven., 1778, p. 429; 511. CADORIN, *Pareri*, 8vo., Ven., 1838, p. 85. MAGRINI, *Intorno il vero arch. del ponte di Rialto*, 8vo., Vicenza, 1854, p. 26.

PALIARY (.....), designed 1757 the "splendid" Marienschanzenkirche, for the cathedral chapter of Prague, finished 1761 by his son. SCHALLER, *Besch. des Stadt Prag.*, 8vo., Prague, 1794-97, ii, 33.

PALIMPSEST. The term applied to ancient manuscripts or parchments which have been twice written upon, the first writing being generally erased to receive the second: often, however, it is not so thoroughly erased but some portion of the original can be recovered by chemical or other means. MONE, *De libris palimp. tam Græcis quam Latinis dissert.*, 8vo., Carls., 1855. The term is also applied to drawings on parchment which have been treated in the same manner; (DRAWING, p. 66, at Reims); also to brasses upon tombs, which have been perhaps removed from their original place, turned over, adapted for other persons, and fixed upon other stones. Such is that to Humphrey Oker, and wife, in Oakover church, Staffordshire, engraved in WALLER, *Mont. Brasses*, fol., Lond., 1846, part 16, which has his many children engraved upon the back of an old brass. That to John Lovekyn, died 1370 and buried in the church of S. Michael, Crooked Lane, London, which was used for Richard Humberstone, who died 7 March 1581, at Walkerne church, Hertfordshire; LONDON AND MIDX. ARCH. SOCIETY, *Trans.*, pt. iii, 133. That to Elena Buttry, found 1858 in S. Stephen's church, Norwich, the effigy of which is supposed to date about 1410, and

was reused for that prioress in 1546, which year it is dated. That at Burwell, Cambridgeshire. An instance of a brass having been used on the same side as the original design occurs at Waterpery, Oxfordshire. WAY, in *Archæologia*, 4to., 1844, xxx, 121, describes one at Hedgerley, Buckinghamshire, and others.

Instances may be found at Cuxton on the banks of the river Medway, at Isleworth and elsewhere: in the church of S. Margaret at Rochester (GENTLEMAN'S MAGAZINE, Dec. 1840); at Mawgan, near S. Columb, in Cornwall, where a brass of *temp.* Edward III, which does not appear to have been used, has been cut to pieces to supply material for effigies of several of the Arundells who died *temp.* Elizabeth; two pieces are engraved in EXETER ARCH. SOCIETY, *Transactions*, 4to., Exeter, 1849, iii, pl. 16, with essay by C. Spence; and in the south aile of the church of Southfleet, near Gravesend, is a brass with an effigy to Johanna wife of John Urban, esq., who died 11 June 1414; while in the chancel is another brass with effigies of the wife and husband, the latter of whom died 16 Nov. 1420; (p. 36-38). The curious examples in the church of Standon Massey, Essex, are fully described by FRANKS, in SOCIETY OF ANTIQUARIES, *Proceedings*, 2nd ser., 8vo., Lond., 1877, vii, 123. 14.

A curious early instance of the re-use of sculptured slabs, is mentioned by LAYARD, *Discoveries at Nineveh*, 8vo., Lond., 1851, p. 230-1, who states that "in the south-east corner of the mound at Nimroud, the slabs of the edifice were taken from another building, chiefly the north-west palace, the sculptures being placed *against* the wall of sun-dried bricks; the backs of the slabs, smoothed preparatory to being re-sculptured, having been turned towards the interior of the chambers".

PALING. A fence now formed of wood pales, fixed upright, either close together, one a little way on the other similar to weather boarding; or at a distance apart, when it is called "open paling". The pales which are usually of cleft oak, about 5 ins. wide, and about half an inch thick feather-edged, are usually 4 ft. long, nailed close as above to two arris rails morticed and pinned to oak posts placed about 9 ft. apart: they are also made 5 ft. and 6 ft. long, and then have three rails: finished at bottom with a 1½ in. oak plank 12 ins. wide; and at top with an oak capping, sometimes completed by a row of tenter hooks, or spiked with nails before being fixed. Sometimes each alternate pale is placed three or four inches higher than its neighbour, giving the fence an embattled appearance. "Open paled fences" of sawn pales are usually of fir spiked to sawn rails let into oak posts: and the pales generally cut to a point at the top. It is said that this fence is peculiar to Great Britain and Ireland, and is very seldom seen on the Continent. FENCE. HURDLE. POST AND RAIL.

Records show that the paling, as now in country parts, was often made of staves of disused casks; thus occurs: "For seven empty casks for making paling for the bridge of Rothelan, 3s. 8d." (*i.e.* Ruddlan castle, *temp.* Edward I, 1281-2: "for twenty-two empty casks—for the queen's court-yard": ARCHÆOLOGIA, 1812, xvi, 65; 68: and at Carisbrook castle, 1270, "Six empty casks bought for making the paling of the herbary, cost 5s. 6d.; HELLIER, *Hist., etc., of the Isle of Wight* (unpub.), given in BUILDER *Journal*, 1857, xv, 188.

One of the ancient Roman fences was a paling of wood made of upright stakes *(pali)* interlaced with brushwood, or having two or more cross-spars passed through holes drilled in the stakes, after the manner of what are now termed flakes. A strong paling to enclose hares was made of upright stakes drilled with holes, through which poles were passed horizontally, the whole of oak or cork-tree timber, braced, and as it were latticed by planks nailed diagonally, much in the fashion of wooden hurdles: SMITH, *Dict. of Antiq.*, 1851, p. 47*a*; 69*b*.

The queen's garden 1654 at Stockholm, "is about 6 or 7 acres of ground encompassed with a pale, on which they bestow timber enough in the posts and rails, and the pales are not set upright one by another, but crosswise one upon another, between two great posts, with rivets for the pales to be put into, and so to fall down one upon the other; and the pales are two inches thick or more, made of fir timber, and the posts and rails of oak"; WHITELOCKE, *Embassy to Sweden*, 8vo., Lond., 1855, ii, 290. 14.

Fences about 4 ft. 6 ins. high made with fir pales fixed to three arris rails with oak posts not more than 8 ft. apart, and twice tarred or painted four times in oil, are recommended as the division for fodder yards by DEAN, *Essays*, 4to., Stratford, 1849, p. 30, who says that the paling should be "hopped", that is, one long one and one short one placed alternately; the lower division will thus be nearly close, for the purpose of keeping in or out small animals, and the upper division comparatively open. If fir posts be used they should be charred at the bottom ends, and well saturated with coal-tar before they are fixed in the ground. In the BUILDER *Journal*, 1850, viii, 188, it is stated that a yellow deal fence presented no appearance of decay at the expiration of seventeen years, even though it had not been covered with anything; and suggested that oak fences undressed are the most durable. The same *Journal*, xii, 468, notices an American assertion that posts fixed with the root end downward rotted at the bottom; while others in the reverse position remained sound. POST.

It does not matter if the timber for oak pales be old or green, with this exception,—that in cleaving old timber the whole of the decayed sap must be removed, whereas in new timber the whole of the stuff may be worked up. The timber ought to be clean butts from 12 ins. to 14 ins. through, to make good pales. The butt is split into eight or twelve pieces according to the size; then each piece has about 1½ in. taken off from the pith, and the pales are then cleft out of it. The black outside edges are then chopped off, and the pales shaved with a common handshave so as to make them of neater appearance; BUILDING NEWS *Journal*, 1872, xxiii, 271. A timber contractor of much experience states that "he would not hesitate to convert timber into posts and rails directly it was felled, and after a few weeks' seasoning it would be sufficiently dry to be fixed. If seasoned too long before fixing, the first day's damp weather will cause the rails in the mortices to swell and split the post. Except in this instance, no difficulty has been experienced through posts splitting in park fencing: when using fir posts, railway companies sometimes hoop the top of such posts with common iron hooping. (1877.) T. and B.

PALISADE, PALISADO and PALISADING. A fence formed of pales or stakes driven into the ground. HOLMES, *Academy of Armory*, fol., Chester, 1688, l, iv, 32, suggests palisade or stockade as the right explanation of the Latin *propugnaculum* (BRETESS). The Fr. *pallisade* is better explained as stockade; and it is applied to a row of trees cut into various forms. NEVE, *Dict.*, 8vo., Lond., 1736, describes "Palisade or Palisado, as a sort of slight open pale or fence set to beautify a place or a walk. Setting up of Pallisado pales (if the heads are handsomely cut, the pallisades mortis'd through, the posts at the corners higher than the rest, and the rails, kneeling rails) is worth 14s. per rod, carpenter's work and sawing." He refers to the palisado pales at the Bowling Green at Mount Ephraim at Tunbridge Wells; and another behind it; and at the Walks there, as well known; there being such variety and workmanship in them. The gates are equally various: and he mentions 'palisado work of iron in gates, or otherways'. The only sorts of gates specifically mentioned by NEVE, s. v. Gates, are "pallisado gates 6 or 7 ft. high; semi-pallisado gates with kneeling rails at the top, handsomely moulded on both sides, and square pallisades, raised pannels and bisection mouldings on both sides, the gates about 8 ft. high, and the posts a foot square, opened in the front, or revailed with a moulding struck in it on both sides the revail, a base and capital laid on the posts, and the heads cut into one of the Platonic bodies; as suppose an icosaedron, and the posts about 10 or 11 ft. above ground; and pold-gates (which are such as are set in fences to shut up the passages into fields and other inclosures), made of timber either cleft or sawed."

"Bedford Row—with a handsome close before the Row of buildings, inclosed in with palisado pales and a row of trees—with freestone pavements and palisado pales before the houses"; STRYPE, fol., *Lond.*, edit. 1720; b. 3, p. 254. 5. 4.

PALISSOT (SEBASTIEN), architect in ordinary to the duke of Lorraine, was ennobled at Luneville 16 March 1722. PELLETIER, *Nobiliaire.*

PALISANDER (Fr. *bois de Palixandre*). A name with Jacaranda and Palaxander used on the Continent for ROSE WOOD. HOLTZAPFFEL, *Woods*, 8vo., Lond., 1843, p. 99; 104. 23.

PALITANA, as it is usually called, or Sutrunjya, situated on the eastern coast of Gujerat, thirty miles from Gogo. "No survey of it has yet been made, nor have its temples been counted; but it covers a very large space of ground, and its shrines are scattered by hundreds over the summits of two extensive hills, and in the valley between them. The larger ones are situated in *tûks* or separate enclosures, surrounded by high fortified walls; the smaller ones line the silent streets. It is a city of the gods, and meant for them only, and not intended for the use of mortals:" FERGUSSON, *Indian Arch.*, 8vo., Lond., 1876, p. 226, who gives a view of it from a photograph. The Jains, believing to a greater extent than the other Indian sects in the efficacy of temple building as a means of salvation, Palitana exhibits examples extending through all the ages during which it flourished; some of the temples are as old as the 11th, and down to the present century; the largest number and some of the most important were lately erected or are being now erected, and by no means disgrace the age. There "the student can see the various processes by which cathedrals were produced in the Middle Ages, carried on on a larger scale than almost anywhere else, and in a more natural manner" (p. 228). Some fine sculptures were shown in photographs in the 1871 Exhibition at South Kensington. JAINIST ARCHITECTURE.

PALITO, TERRA DI. A light yellow ochre differing much from yellow, Oxford, and stone ochres, but affording tints rather purer in colour than the brightest of them, but less so than Naples yellow. FIELD, *Chromatography*, 8vo., Lond., 1841, p. 148.

PALLACH or POLLACK, see POLLAK (L.).

PALLADIAN STYLE or SCHOOL OF ARCHITECTURE. A manner, taking its name from its introducer Andrea Palladio. "We may remark", writes QUATREMÈRE DE QUINCY, *Dict.*, "that the style of Palladio has a propriety, which must have facilitated its propagation. It is indeed a sort of medium between that vigorous severity, which some exclusive minds abuse in the endeavour to imitate the classic style, and the licentious anarchy of those who refuse to recognise rules, which rules allow of exceptions. In the conception and execution of the edifices by Palladio there is always a clear intuition, a simple method, a sufficiently perceptible accord between need and pleasure, and such harmony in this accord that it would be difficult to say which gave the law to the other. His manner offers to all countries a model easy of imitation. The talent of the author of it is doubtless the principle whence this facility emanates, but this facility of adapting itself to everything and being adopted by all, is what distinguishes his talent and generalises its influence. In fact, it may be said with truth, that Palladio has become the most universally followed master in all Europe, and in some sort the chief of the modern school in civil buildings. This school has been reproduced in England with the greatest success, as in the case of Inigo Jones and others."

"Palladio's works generally have been greatly and indiscriminately overpraised by successive writers, who seem to have merely repeated one another. Among the many who have extolled Palladio's extraordinary merits, but without attempting to show wherein they consist, may be named Goethe, Quatremère de Quincy, Forsyth, Hope, and Beckford"; PENNY CYCLOPÆDIA, s. v., which article notices that "Palladio's works abound with defects and solecisms—as engaged columns, etc., belonging to the style itself, the dryness and littleness of manner frequently resulting from an order being adapted only to a single floor of a building; windows cutting into architraves, windows within friezes, doors lower than windows, figures on the raking cornices of window pediments, naked and dressed windows in the same composition, etc.; with perhaps ugly balusters, mean attics, offensively wide intercolumns, heavy pediments, meagre entablatures and columns, particularly in the Ionic order, and above all a dryness, mannerism, and monotony of detail.——"

"The taste of Palladio was tempered by the care he bestowed on accommodating exterior beauty to interior convenience, and by suiting the art to the wants of persons with moderate means, through the medium of greatness without great dimensions, and richness of effect without great outlay. In the imitation of the architecture of the ancients, none of his predecessors of any of the schools had so luckily hit on that just medium of exactness without pedantry, of severity without harshness, of liberty without licentiousness.....It was from the peculiar properties of Palladio's taste and style, that they found in England a second native country where Inigo Jones, Wren, Gibbs, Taylor, Chambers, and many others, have naturalised his plans, façades, distribution, and details; indeed, the style of Palladio could not be prevented from spreading through Europe, as a mean between the severe use of ancient forms and the licentious style of those who reject all rules whatever. The buildings by him exhibit great good sense, simple means of accomplishing the end, a satisfactory agreement between the demands of necessity and pleasure, and such an harmony between them that it is hard to determine which has submitted to the other. The interior distribution of his palaces and villas in respect of plan would, however, without considerable modification, be but ill suited to modern habits. His plans were convenient to those for whom they were executed; and in that way they must be judged. With his eyes constantly turned to the practice and detail of the ancients, he acquired a bold, simple, and agreeable style; and, his churches excepted, the beauties of the master are to be sought in the façades, and in the quadrangles of his palaces. Pedestals, either with panels or raisings, were always avoided by him; the architraves were rarely sculptured; and the upper ornaments of his entablatures were always carefully centred above each other. The doors, windows, and niches are composed with great simplicity; and pediments, when used, are unbroken. In the members of the cornices he never lost sight of the character of the order employed, and was extremely particular in duly adjusting its profiles; he, however, did not scruple to vary the proportions of an order according to the nature of the building to which it was applied; and in the proportions of his churches and apartments he seems to have delighted in arithmetical, geometrical, and harmonic proportions. Though extremely partial to the use of the Ionic order, yet the others were not unfrequently used by him. His Corinthian capital is not to be praised; it is profiled very clumsily, and ought not to be followed. The domes which he erected are almost invariably hemispherical. It is not to be supposed that his buildings are perfect, though they approach perfection; but it is more than probable that many of the abuses seen in them arose either from want of sufficient superintendence, the number he designed being very great, or that they were introduced after his death; and because the instructions in his work on architecture are very peremptory on the subject of abuses;" abridged from GWILT, *Encycl. of Architecture.*

"Palladio's buildings are in general very beautiful, but most of them are at present (1816) in a very forlorn condition. The fronts and even the columns are of brick, the entablatures of wood; and the stucco, with which they both have been covered, is peeling off. Palladio's columns are mostly mere ornaments; but in contemplating his buildings, it is impossible to feel this to be a fault. The sculpture, which loads the pediments of the windows is certainly ill placed; and still worse is the little panel of bas-relief so frequently introduced over the lower win-

dows; dividing what ought to be a solid mass, into two miserably weak arches. What is it then that pleases so much, and so universally, in the works of this artist? It seems to me to consist entirely in a certain justness of proportion, with which he has distributed all the parts of his architecture; the basement being neither too high nor too low for the order above it; the windows of the right size, and well spaced; and all the parts and proportions suited to one another. The same excellence is found in his orders, and the relation of the columns, capitals, entablatures, etc. He has not adopted the theoretical rules of another, but has drawn them all from what he felt to be pleasing to himself, and suited to his own style of art; but they are not good, when united to a more solid and less ornamental manner"; WOODS, *Letters of an Architect*, 4to., Lond., 1828, i, 240. "In the works of San Michele and Scamozzi, it will be observed how successfully they often departed from conventional rules; and in the works of Palladio, how a strict attention to such rules substituted elegance for sentiment and power"; *Handbook* to Northern Italy, 1842. W. PAPWORTH, *Peculiar Characteristics of the Palladian School of Architecture*, Prize Essay, 1848; and abridged in *Sessional Papers*, Royal Inst. of Brit. Archts., 18 Nov. 1850. Palladio's designs have been adopted and adapted by many of his imitators; Scamozzi, Colin Campbell, Ware, and others, especially;—The villa Capri has been imitated at Chiswick, near London, for the duke of Devonshire; at Mereworth, Kent, on a larger scale, for John Fane, seventh earl of Westmoreland, by C. Campbell; at Foots Cray place, Kent, for Bouchier Cleeve, earl of Westmoreland (NEALE, iv, ser. ii); Nuthall, Nottinghamshire (DALLAWAY, *Anecdotes*, 1800, p. 148); and at Inverigo in Italy, by L. Cagnola, for himself. Bramham Park house, near Leeds, is a fine specimen of a Palladian villa, erected in the reign of queen Anne, (NEALE, v), and belonging in 1864 to George Lane Fox, esq.; the name of the architect is unknown. The "Palladian" bridge at Wilton, near Salisbury, by R. Morris, is given in GANDON, *Vit. Britt.*, ii, pl. 82.

It may be observed that, whereas the English School has adopted the style of Palladio, the French has hitherto followed that of Vignola.

PALLADIO (ANDREA), born 30 Nov. 1518 at Vicenza, accompanied his earliest patron Gian Giorgio Trissino in 1541, and twice again, to Rome, employing himself there in measuring and drawing the antiquities. The first edifice attributed to Palladio was the restoration about 1534 of the palazzo Trissino at Cricoli. In 1540 he designed the palazzo Godi at Lonedo. In 1547 he was engaged in the grand public palace at Udine, called Il Castello, begun 1519 by Giov. Fontana, who is supposed to have been his master; and furnished 1545–49 the design for the screen of two orders, on three sides of the sala della Ragione at Vicenza (*Illustrations*, s. v. Basilica, pl. 123) which established his reputation. Then followed the palazzo Tiene at Vicenza; a palace for the Foscari family near Malcontenta; the first story of the public palace at Feltre (the second one was by another architect); and the gateway at Bassano; these two last works are attributed to him. At Venice, he designed a Corinthian atrium 42 ft. wide, by 56 ft. deep, and an inner one 80 ft. by 66 ft., to the monastery della Carità, and later the church itself. The refectory, and afterwards 1556 (the façade 1610), of the church of S. Giorgio Maggiore; the façade 1562 to the church (by Sansovino) of S. Francesco della Vigna; the church 1578-80 of Il Redentore alla Zuecca after the plague of 1576; the churches of the Zitelle, and of Sta. Lucia, are attributed to him; and he was engaged at the Ducal palace, but his design was not carried out: he also designed a triumphal arch for the entry of Henry III; and a hall with Corinthian columns. His design 1554 for the bridge of the Rialto was not carried out; nor a stone bridge over the river Brenta near Bassano, but he erected one of timber often referred to (CRESY, *Encyc.*, p. 1366): it was destroyed 1748 by a flood, repaired by B. Ferracino, destroyed 1813 by the French, and rebuilt by Casarotti. At Maser, he designed a palazzo for Marc Antonio Barbaro; and a circular temple about 35 ft. diam., being a complete model of the Pantheon at Rome; a dwelling for the Trissino family upon a hill at Meledo, near Vicentino; a large palazzo for Francesco Pisani at Montagnana; and made three or four designs for the façade of the church of S. Petronio at BOLOGNA which are still preserved in the archives of the church; where he also designed the portico and north elevation of the palazzo Ruini, afterwards Ranuzzi, and now Baciocchi. In Piedmont he laid out the ancient royal Park; was also invited to Trento to rebuild a palazzo; and to BRESCIA, where the cathedral (commenced 1604 by G. Lantana) and the governor's palace are attributed to him, but the latter was begun by Bramante, the windows, however, are said to be by Palladio. At Vicenza he completed the palazzo of count Valmerana; and designed the façade, and a room of beautiful proportions in his house, which has been attributed to count Cogolo: also the palazzo of count Chiericati; the palazzo Barbarano; and pal. Porto; but not those of Coldogno and Pioveni, as asserted by TEMANZA: probably restored the palace of count Schio now belonging to the Franceschini; and outside the walls he erected on an eminence the famous villa del Capri, the inside stucco work of which is most refined and elegant: the families Godi, Pioveni, Boiana, Coldogno, Tiene, Pisani, and other noble families possess Palladian edifices. The arch to the flight of steps leading to the church of the Madonna del Monte Berico; the house and lodge in the garden of count Valmarana at the gate of the castle, near which also is the palazzo Tiene; the palazzo of count Porto at Vancimuggio, are all attributed to Palladio, but probably are not by him. At PADUA is a palazzo by him in the department of Santa Croce, containing many conveniences in a small enclosure: in that city the palazzi Aldrighetti, casa Abriani, and casino Molini, are attributed to him and also to don C. Cerati; the staircase in the palazzo del Capitano, 1607, is by V. Dotto. Near Venice are many Palladian edifices; for signor Bernardo at Stra; for S. Badoero at Frata; for S. Emo at Fanzuolo; for counts Manini at Masera; for the Cornari family at Piombino; for the Valmerana family at Lisiera; for the Pisani family at Montagnana; for signor Zeno at Motta; and there are few places where something is not attributed to him; and many smaller works are given in his own publication. He designed after the antique, two theatres of timber, one at Vicenza, the other at Venice; and at the former city he erected one of stone; this is the well-known Olympic theatre begun 23 May 1580, and completed 1583-4 by his son SILLA; WOODS, *Letters*, does not allow it to have the merits usually accorded to it. The famous theatre at Parma opened 1618, is attributed to him, but it was designed by G. ALEOTTI (not by D. Ferrari, as often stated), G. B. Magnani, and L. Spada, painter, and completed by Bernini, as stated by MILIZIA. LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 543, mentions that while Palladio was measuring in Rome, he erected an altar in the middle of the long hall of the hospital of S. Spirito, and this altar was the only production by him in Rome.

Palladio died 19 August 1580, aged 62 years, and was buried in the church of Sta. Corona at Vicenza. His remains were, under the will 11 July 1830, of G. Velo, removed 19 August 1845 to a new monument in the cimitero comunale designed by G. Fabris. He had four sons; Marco Antonio, sculptor, died 1600; LEONIDAS, who assisted his father, died about 1574; HORACE, who studied the law, died about 1574; SILLA, who studied architecture, died about 1627; and a daughter Zenobia.

Having studied the antique and VITRUVIUS, Palladio published *Le Antichità di Roma*, 8vo., Ven., 1554; 1555; 1565; Rome 1576: other editions 1587; 1609; 1622; 1622; plates 1625; 1637; plates 1650; in Latin 1618: Lat. and Ital., with notes by C. Fairfax, 8vo., 1709: in French by P. de Launay, 8vo., Arras, 1612; in Span. by H. Francini, 8vo., Rome, 1589. He explained the form of the Latin theatre; described the Ionic volute; and drew out the figures for the edition of VITRUVIUS published 1556 by M. Barbaro. He illustrated the *Commen-*

taries of CÆSAR, published, 4to., Ven., 1575; 4to., Rome, 1618; wrote upon POLYBIUS, and also upon theatres, etc., the two last are, however, not published; the MS. remained in the possession of G. Contarini, who, dying soon after, the designs were dispersed; Lord Burlington obtained many portions of them, and they were published by him as *Fabbriche Antiche*, fol., Lond., 1730; by C. CAMERON, *The Baths of the Romans, etc.*, fol., Lond., 1772; and as *Terme dei Romani*, by O. B. Scamozzi, fol., Vic., 1785; a 4to. edit., Vic., 1797, also appeared: the baths of Agrippa are wanting in the collection. Others of his drawings are noticed in *Some Description of a Collection of Architectural Drawings by A. P., in the possession of the duke of Devonshire, at his villa at Chiswick*, drawn up by Messrs. Poynter and Donaldson, and read at the Royal Inst. of Brit. Archts., 17 Nov. 1845: about 250 are presumed to be by Palladio himself: and there is a framed collection of his drawings of designs and antique edifices exhibited in the museum at Vicenza.

Palladio also published *I due primi libri dell' Antichità*, fol., Ven., 1570, now very rare; and *I quattro libri dell' Architettura*, fol., Ven., 1570, with woodcuts: there is a spurious edit., fol., Ven., 1570, with copperplates. This was followed by other editions in 1581; 1601; 1616; 1642 in four vols.; *Architettura di A. P.*, by N. N., 4to., Ven., 1711; and in 8 vols., fol., Ven., 1740-48. *L'Architettura*, Fr. and Ital. text, fol., Ven., 1741; ristampi di G. B. Pasquale, 1768; 1770; fol., Siena, 1790. *L'Architettura*, fol., Paris, 1642, 2nd edit.; by N. DUBOIS, fol., Hague, 1726. *Les quatre Livres d'Arch.*, par FREART DE CHAMBRAY, fol., Paris, 1650, the first French edition. *The Architecture of A. P.*, transl. by G. LEONI, fol., Lond., 1715-6; 1721; and 1742, which last edition contains notes by I. Jones: printed in French by N. DU BOIS, fol., Hague, 1726: and an appendix *On the Antiquities of Rome:* also, translated by I. WARE, fol., Lond., 1738, now scarce: also, transl. by B. Cole, drawn by E. HOPPUS, fol., Lond., 1735; 1736. *Libri de la Arquitectura de A. P.*, par F. DE PRAVES, *cir.* 1625: and *Los quatros libros de Arq. civil*, traduc. par J. ORTIZ Y SANZ, 96 pl., fol., Madrid, 1797. Many abridgments in the above languages have also been published, such as *Delle cinque Ordini di Arch.*, 24 pl., 4to., 1746: *Traité des cinq Ordres d'Arch.*, par LE MUET, 4to., Paris, 1626; 1647, 78 pl., 8vo., Amst., n. d.: *Five Orders of Arch.*, revised by C. CAMPBELL, fol., Lond., 1729; *The First Book of Architecture*, transl. by G. Richards, 4to., Lond., 1733.

Le Fabbriche ed i Disegni, raccolta, etc., par O. B. SCAMOZZI (sometimes with the French text only), 4 vols., fol., Vic., 1776-83; 1786-7; a smaller edition of it, 4to., Vic., 1796-7. *Fabbriche e i Disegni di A. P.—e le Terme; nuova edizione Italiana, del cav. C. Foppiani*, fol., Genoa, 1843-44. *Œuvres Complètes de A. P.—et le Traité de Thermes*, by CHAPUY, CORREARD, LENOIR, and BEUGNOT, fol., Paris, 1825; 1842; 1852. N. N., *A. P. Fabbriche inedite*, 2 parts in 1 vol., 61 pl., fol., Ven., 1760. N. N., *Lo Studio dell' Archit. di A. P.*, 93 pl., fol., Vic., 1800. ARUNDALE, *The Edifices of A. Palladio*, fol., Lond., 1832, from measurements taken with J. B. Atkinson (of York), consisting of the Olympic theatre, the palazzo Chiericati, the screen to the sala della Ragione, and the villa Capri; with a memoir of Palladio.

MAGRINI, *Memorie intorno la vita e le opere di A. P., publicate nell' inaugurazione del suo monumento in Vicenza, li 19 Aug. 1845, etc.*, 4to., Padua, 1845-6. SCOLARI, *Della Vita—V. Scamozzi; giuntovi le notizie di A. P.*, 8vo., Treviso, 1837; app. 1838. RIGATO, *Osservazione sopra di A. P.*, 8vo., Padua, 1811. GUALDO, *Vita di A. P., publié par G. Montanari*, 8vo., Ven., 1749. TEMANZA, *Vita di A. P.*, 4to., Ven., 1762. QUATREMÈRE DE QUINCY, *Vics*, 4to., Paris, 1830, gives the Basilica and the Trissini palace. VASARI, *Lives*, 8vo., London, 1852, iii, 444; v, 201, 422, 486. WOODS, *Letters of an Architect*, 4to., Lond., 1828, i, 238-45. WARING, *Critical Notes*, in BUILDING NEWS *Journal*, 1872, xxii, 180. 1. 3. 5. 14. 25. 26. 30. 34. 94. 105.

PALLADY and PALYDYE (RICHARD), elected scholar from Eton to King's college, Cambridge, 1533, does not appear to have taken a degree. He became overseer or clerk of the works to the duke of Somerset for his palace in the Strand, London, commenced 1546, and continued until his loss of power 14 Oct. 1549. In October he was, with other servants and friends of the duke, committed to the Tower, whence he was liberated 25 Jan. 1549-50, on entering into his recognizance in 1,000 marks to be forthcoming before the lords of the council, upon reasonable warning, to answer to such things as should be alleged against him. He was living in 1 and 2 Philip and Mary; and had property in Warwickshire and Lancashire. Somerset house was one of the first large buildings in England in which the Italian style of architecture was extensively employed. WALPOLE, admitting that he knew nothing on the subject, boldly conjectured that it was designed by John of PADUA; it is, however, much more probable that Pallady is entitled to the credit of being the architect, as in those days overseer and clerk of the works were the terms employed to designate an architect. The similarity of this person's surname to that of a great Italian architect, his contemporary, is curious: COOPER, *Athenæ Cantabrigienses*, 8vo., Lond., 1858, i, p. 125. BURNET, *History of the Reformation*, fol., Lond., 1619-1715, states that "the noble palace he (Somerset) was raising in the Strand (which yet carries his name), out of the ruins of some bishops' houses and churches, drew as public an envy on him as anything he had done. It was said, that when the king was engaged in such wars, and when London was much disordered by the plague that had been in it for some months, he was then bringing architects from Italy, and designing such a palace as had not been seen in England;" edit., 1865, ii, 237. "This house (erected 1549) is low, and built in that which was then the Italian manner, by architects sent for from Italy. There is a pretty deal of symmetry in it, and something uncommon.—The front of this palace, a very slight piece of work, is opposite to the houses of shopkeepers, and has shops adjoining to both sides"; MISSON, *Memoirs*, etc., *Travels over England*, transl. by OZELL, 8vo., London, 1719, p. 303. Two views, folio size, were drawn and published by W. Moss, March 1777, aquatinted by F. Jukes; the date 1612 is on one water-pipe, and 1747 on the clock turret: drawings by Sandby are in the British Museum, Crowle Collection, xiii, 30, 31. An outline elevation is in the volume of drawings by John Thorpe in Sir John Soane's museum, and engraved in KNIGHT, *Old England*, fol., Lond., 1845. HARWOOD, *Alumni Eton.*, 154. STRYPE, *Mem.*, ii, App., p. 92. STRYPE, *Life of Sir T. Smith*, 42. TYTLER, *Edw. VI and Mary*, i, 272, 275. *Ducatus Lancastriæ*, i, 269, 298, 302. *Eighth Rep.*, D. K. Rec., Append. ii, 7. The *Add. MS.* 5755, f. 262, etc., in the British Museum shows that the building was continued as late as 1556.

PALLANTIA. The ancient name of PALENCIA in Spain.

PALLAS. The Greek surname of the goddess Athena. The Romans gradually transferred all her attributes to the Roman MINERVA. The forum of Nerva at Rome was called the temple of Pallas.

PALLIARDI (IGNAZ). A celebrated architect born 1733, flourished in Prague about 1758. 26.

PALL MALL. The name of a French game, *pale maille* or *paille maille*, "wherein a round bowle is with a mallet struck through a high arch of iron (standing at either end of an alley), which he that can do at the fewest blows, or at the number agreed upon, wins. This game was heretofore used in the long alley near S. James's, and vulgarly called Pell-Mell"; BLOUNT, *Geographia*, edit. 1670. "Oct. 1660. A *Pall Mall* made on the further end of St. James's Park, which was made for his Majesty to play, being a very princely play"; British Museum, *Add. MSS.*, 10,116-7, fol. 129*b*. The game had been introduced into England before 1650: Sir R. DALLINGTON, *A Method for Travel*, 4to., 1598, wonders the game had not been yet brought out of France; CUNNINGHAM, *Handbook*, 8vo., Lond., 1850, p. 372.

PALLONE. A national game of Italy, played with a heavy ball, now 5 ins. in diam., made of two coats of cow-hide inflated

with air, which is struck by the arm of the player guarded by a *bracciale* or gauntlet, a hollow wooden cylinder 9 ins. long and 8 ins. in diam., having the outer portion formed of pyramidal points. The arena about 300 ft. long by 60 ft. wide has on one side a high wall, while on the three others are seats for the spectators, etc. I. Aleandri designed and erected 1823-6 the noble building at Macerata, said to be the largest one known for this game; it is given by him in *Sferisterio*, fol., Fir., 1828. A circus at Forli was erected in 1824. SCAINO, *Trattato del Giuoco della Palla*, 12mo., Venice, 1555, with cuts. FISHER, *The Game of Pallone*, 8vo., Lond., 1865.

PALLOY (PIERRE FRANÇOIS), born Jan. 19, 1754, at Paris, joined the revolutionists, and as architect to the city of Paris, was ordered July 1789, to pull down the old fortress of the Bastille. With the best stones were carved busts of the heroes of the epoch; and also models of that edifice, which were sent to the assemblée nationale, to the ministers, and to eighty-three departments, and one to Louis XVI. With others of the stones he *built* the pont de la Révolution, now de la Concorde, but it was designed 1790 by Perronet. He presented to the national assembly a design for a column to be erected on the site of the Bastille, asking for a concession of the ground as a recompense, which was granted 27 June 1792, but was not acted upon. He appeared 10 Aug. in the attack on the Tuileries. After having been imprisoned 1794, he retired to Sceaux (Seine); obtained 1830 a pension of 500 francs; and died there 19 January 1835. 112.

PALM. An ancient and also a modern measure of length, in use in various countries. (It. *palmo*.)

	Engl. foot.			Engl. foot.	
Cagliari	·6642 W.	Rome		·783 H.	
Carrara	·8000 W.	—	palmo	·2515 Folkes	
Genoa	·812 Howard			·7330 W.	
	·8 } Cavallo	—	— of Arch.	·7325 F. and W.	
	·817 } Cavallo	—	— Ditto	·223439 metre	Engl.
	·8173 Woolhouse			·244389 yard	Engl.
Malta	·915 H			·733168 feet	Engl.
Naples	·861 H			8·798 ins.	
	·859 C	(HEAD, *Rome*, 8vo., Lond., 1849, i, App. C., p. 519.)			
	·8652 W				
Palermo	·7942 W.	Sardinia		·8150 W.	

Portugal palmo Craveiro $8\frac{8}{55}$ ins. or 43 : 60 : : Port. palm : to Engl. foot nearly; MURPHY, *Batalha*.

LETAROUILLY, *Rome Moderne*, p. 141, states that the *palmo da muratore* equals 0·22342 of a metre, and is subdivided into 12 parts called *oncie*, and the *oncia* into 5 parts or *minute*. The *braccio* or *passetto* is equal to three palms.

The palm is used in the works of WINCKELMANN, and in VISCONTI, *Antiq. d'Herculaneum*. The palm of Genoa 9 ins. 9 lines; of Naples 8 ins. 7 lines; Palermo 8 ins. 5 lines; and the modern Roman 8 ins. $3\frac{1}{2}$ lines.

HERODOTUS, ii, 149, explicitly states 1 stadium = 100 orgyiæ = 400 cubits = 600 feet = 2400 palms: (CUBIT).

4 digits or fingers = 1 palm (the old palm) = 2.914 ins. or nearly 3 ins.

4 ,, = 1 foot
6 ,, = 1 cubit
24 ,, = 4 ,, = entire height of a man.
4 ,, = 1 pace or fathom.

(BONOMI, *Proportions of the Human Figure*, 8vo., Lond., 1856.)

			of a ft.	of an in.	also
Digit or dactyle	= $\frac{1}{16}$ of a ft.		·060675	·7281	·725
Pollex or uncia	= $\frac{1}{12}$,,	1½ digit	·0809	·9708	·967
Palmus minor	= $\frac{1}{8}$,,	3 pollices or 4 digits	·2427	2·9124	2.901
Palmus major or late tines	= $\frac{3}{8}$,,	9 pollices or 12 digits	7281	8·7372	
Pes		12 pollices	·9708	11·6496	11·604

Canna 10 ft. Braccio sometimes 2, sometimes 3 feet, and is divided into 4 palms. Jacobus CAPELLUS, 4to., Frankfort, 1607, p. 22.

The ancient Roman great palm contained 12 digits or 9 pouces du pied du roi; the small palm or breadth of the hand or 4 digits or 3 pouces; according to MAGGI, the ancient Roman palm was 8 pouces $6\frac{2}{3}$ lignes; the Greeks had palms of 5 and of 4 digits; QUATREMÈRE DE QUINCY, *Dict.* 25.

The Greeks made square bricks of 5 palms, *pentadoron*, and 4 palms, *tetradoron*, equal to about $14\frac{1}{2}$ ins., and $11\frac{1}{2}$ ins. square (BRICK, p. 137).

According to the register (fourteenth century) of the monastery of Christchurch at Canterbury, preserved at the British Museum, *Cotton MS.*, Galba, E iv, fol. 21*b*, 28, 28*b*, 29, the foot consisted at that time of four palms, each palm being thrice the thickness of the thumb at the root of the nail. The complete scale of the sixteenth century gives the breadth (not the length, as is particularly stated) of 4 barleycorns as making 1 digit or finger breadth; 4 digits = 1 palm (measured across the middle joints of the fingers); 4 palms = 1 foot; 1 foot and a half = 1 cubit; 10 palms or $2\frac{1}{2}$ feet = 1 step, *gressus*; 2 steps or 5 feet = 1 pace, *passus*; 10 feet = 1 perch; 125 paces = 1 Italian stadium; etc.: the foot would thus appear to have been less than the ancient Roman foot of 11·6 Engl. ins. The breadth of the palm was taken as the 24th part of the height of a man: PENNY CYCLOPÆDIA, s. v. Weight, p. 197.

PALM. In botany, a woody plant, mostly a tree, with a simple stem, inhabiting the warmer parts of the world, and especially tropical countries. The palms were among the first land-plants which were created; and there is scarcely a species of this order in which some useful property is not found. Two or three varieties only, of the four or five hundred which are said to exist, are imported into this country from the East and West Indies: they are known in England by the names palm, palmetto, palmyra, and nutmeg, leopard, and porcupine, etc., wood, from their fancied resemblances, as when they are cut horizontally they exhibit dots like the spice, and when obliquely, the markings assimilate to the quills of the porcupine. ARECA; BAMBUSA; BORASSUS; COCOS; JARA; PALMYRA PALM. Palmist, a wood of Asia, weighs 62 lbs. 7 oz. per cubic foot, is also used for cabinet and marqueterie work; the palm of Hindustan weighs 57 lbs. 9 oz. MARTIUS, *Palmarum Familia*, fol., Monachii, 1823-50. ENDLICHER, *Genera Plantarum*; LINDLEY, *Natural System*; WALLACE, *Palm Trees of the Amazon*, 8vo., Lond., 1853.

The ancients regarded the palm branch as an emblem of victory, and it was frequently employed in art to indicate the conquest of a country. A palm branch was by the Greeks and Romans bestowed upon the victors in the circus. It was also an emblem of Christian victory, especially of martyrdom. S. Paul is represented standing at the foot of a palm tree; and in pictures of the Annunciation the angel Gabriel bears a palm branch. ORNAMENT. 6. 25.

Egypt early held sacred the date palm, PHŒNIX dactylifera, which was probably sacred to Osiris as it was to the Sun. A representation of it as the Tree of Life occurs on a very early stele in the Berlin museum, probably anterior to the XV cent. B.C. It occurs on the Nineveh tablets in a conventional form surrounded by an enclosure of palmettes, attended by winged deities, etc. LAYARD, *Nineveh and its Remains*, 1849, ii, 137, 396, 401. HERODOTUS, ii, 169, describes a hall of a temple at Sais, some columns in which were of extraordinary dimensions and resembling palm trees. The Tree of Life mentioned in GENESIS ii, 9, has always been understood to be the date palm tree. It was largely introduced in the decoration of Solomon's temple, as on the walls of the sanctuary, and on the utensils; 1 KINGS, vi, 29, 32, 35; and vii, 36: also EZEKIEL, xl. 16, 22, 26, 31, 34, 37: and xli, 18-20, 25-6. It is represented in the mosaic in the apsis of the church of SS. Cosmo and Damiano in the Forum at Rome; two occur in the church of Sta. Maria in Via Lata. In Christian symbolism, the Cross and the Tree of Life are considered identical; BARLOW, *Symbolism in Reference to Art*, in *Sessional Papers* of Royal Inst. of Brit. Archts., 1859-60, p. 104-5. The origin and use of this emblem is discussed by CASALIUS, *De Ritibus Christ.*, 4to., p. 232: CIAMPINI, *Vetera Monumenta*; HEINECCIUS, *De Sigillis Germanorum*, fol., p. 161: MOLANUS, *Hist. Imag. Sacris*, 4to., p. 534, etc.; ii, 148, 3 C: CYPRIEN ROBERT, *Le Cours d'Hiérog. Chrétienne*; UNIVERSITÉ CATHOLIQUE, iv, 434: Mosaics in the works by BOSIO, and ARINGHI, upon the catacombs of Rome. BIANCHINI, *Histor. Eccles. comprob. monum.*,

fol., tab. 1^a, sæculi 1^i, Nos. 1, 11, 50, 51, 52, and the texts ii, 197, 202-323, 344: Bottari, *Pitture e sculture sagre:* Buonarotti, *Frammenta di alcune Mon.:* Boldetti, *Osservazioni sopra i cimeteri:* Bartoli, *De Lucernis Christ.:* Mamacchi, *Origines et Antiq. Christ.* Fabricius cites many works: and, *Bibliotheca antiquar.*, enumerates many plates. 7.

The palm tree surmounted by an ostrich feather was significant of Lower Egypt or the happy west; it occurs in this sense in the zodiac at Dendera. The palm capital as used in Egypt is given in colours in O. Jones, *Grammar of Ornament*, fol., Lond., 1856, pl. 6, from the portico B.C. 145, at Edfoo; it is represented as of nine branches or faces. The horizontal fasciæ of this capital differ from those of all other Egyptian capitals, inasmuch as there is always a pendent loop. A palm-leaf ornament was painted on the Parthenon; and on the upper fascia of the architrave of the Ionic temple on the Ilissus. A tuft of palm leaves surmounts the cone of masonry on the tomb or pillar of Absalom, at Jerusalem, which is considered of the time of Herod (B.C. 40—A.D. 4) or later.

In Hawkins, *Gothic Arch.*, 1813, p. 106, the dum palm tree is referred to as consisting of from eight to fifteen stems, which, with its fruit being of a triangular form, had its influence in giving the first idea of the clustered column and the triangular form for the pointed arch. He also notices the authors who knew "the fact of its (the palm tree) propensity to resist."

PALMA. The capital of the island of Majorca. It has a wall 36 ft. thick, with 13 bastions, 3 gates, and a ditch. The chief gate was designed 1620 by Antonio de Saura. The castle of Bellver 1309 is about two miles distant. The cathedral dedicated to . . . . . was founded 1230 by Jaime of Aragon the conqueror, who is interred in the *capilla real*, the oldest portion. The façade has two towers, with a delicate spire called "the angel's tower": a south portal called "del Mirador", dating from 1389, was carved by don Pedro Morey: *La seo* 1343 was completed 1601. The three ailes are 190 ft. wide with the chapels; the nave is 71 ft. wide between the centres of the columns; from the high altar to the door it is 247 ft. long, and 147 ft. high. Jayme Fabre, "*magister*" and "*lapicida*", is supposed to have been engaged upon some portions, as he was engaged 1296-1339 upon the church of the Dominicans, which is said to have a clear span of 95 ft. between the walls, otherwise it is unnoticed by writers. There are seven parish churches, of which S. Michael's was formerly a mosque; Sta. Eulalia 1230-50; and S. Francisco 1281, which has a belfry tower and a fine cloister.

The *lonja* or exchange (Germano-Gothic) was begun 11 March 1426-1448 by G. Sagrera, whose contract for constructing or continuing the construction of it, is given in Llaguno, and translated in Street, *Gothic Arch.*, 8vo., Lond., 1865, p. 514-6. It is square on plan, has twelve portals, octagonal turrets at the angles, and a dome; its interior is formed into three ailes with groined vaulting, and the pavement is of black marble: Chapuy, *Le Moyen Age*, iv, or pl. 183. The palace of the governor is a very ancient structure, and comprises also an arsenal, a magazine, and a prison; the town hall (16th century); a general hospital founded 1456; and a spacious and well-conducted lazaretto, comprise the other chief buildings. The *plaza de Toros* will seat 9,500 persons. Taylor, *Voyage en Espagne*, 4to., Paris, 1826-32, gives views of La Sala, plaza de Cort, and La Longa. Laborde, *Itin. Descr. de l'Espagne;* St. Sauveur, *Travels through the Balearic, etc., Islands.* 14. 28. 50. 66. 96.

PALMA (Nicola), born 1694, died 1779, designed 1746-72, the albergo de' poveri (it is also attributed to O. Fioretto); and La Flora or villa Giulia, 1775, both near Palermo. 28.

PALMAS (Las). A city of the island of Gran Canaria, and formerly the capital of the Canary Islands until 1833, when Sta. Cruz de Tenerife was raised to that dignity. A mole 834 ft. long by 84 ft. wide was begun 1811. The houses are large, with terraced roofs and balconies. The cathedral, dedicated to S. Anne, was begun 1500 by D. A. Motaude, but dying in 1530 it was continued by J. de Palacio, who completed it 1570. Castillo, *Descr. Historica*, in the *Biblioteca Isleña*, 1848, p. 145. W. Scott, *Notes on the Cath., etc.*, in Ecclesiologist *Journal*, 1851, p. 29; 1852, p. 204; who states that it was "finished and reconstructed" by don Diego N. Eduardo (1734-98) about 1791-7; and gives the dimensions, which from the west are, four bays each 23 ft. long; three piers each 5 ft. square; two piers at the crossing each 5 ft. square; the cross 30 ft.; the aile 25 ft.; the sanctuary 25 ft.; the whole equal to 197 Engl. feet: the nave is 36 ft. wide, and each aile 27 ft., equal to 144 ft. total width. Three parish churches; a town house; a theatre; an *audiencia* in the buildings formerly occupied by the Inquisition; several convents, etc.; and a very fine general hospital, deserve notice. Glas, *History of the Canaries;* Humboldt, *Travels;* Von Buch, *Descr.* 50. 66. 14 and supp.

PALMETTE. The floral ornament that is most usually found in Assyrian, Etruscan, Greek, and Roman works. In England, by some authors and most workmen, the name Honeysuckle is given to it. "It is more likely that the slight resemblance to the honeysuckle may have been all after recognition, than that the natural flower should ever have served as the model;" Jones, *Grammar of Ornament*, fol., Lond., 1856, s. v. Greek Ornament. It is a small ornament, one of those called running ornaments, and appears to be a diminutive of the Palm, which it resembles in the symmetrical arrangement of its leaves, which are sculptured of a somewhat conventional form on all kinds of plain surfaces, on buildings, furniture, or vases. The palmette, the meander, and the Vitruvian scroll, are the ornaments most frequently found on Greek painted vases: it is there seen either forming the line whence the figures rise, or ornamenting the borders and fringes of tunics and stuffs. Generally the points of the leaves of which it is formed are turned over and finish in a rounded form. It was said in 1832 that the palmette has become a very common ornament of late years, one might say too much so, as is the case with everything that becomes fashionable, for fashion excludes reason from everything of which it takes possession. 25.

Illustrating the hotel Vogué at Dijon, 1607-14, Rouyer et Darcel write, "On remarquera dans la frise sculptée du linteau cet ornement en éventail qui procède de la palmette antique, qui se transforme en coquille au milieu du seizième siècle, et qui se poursuit à travers le dix-septième et le dix-huitième, en subissant néanmoins de profondes modifications;" *Histoire de l'Art Architecturale en France*, 4to., Paris, 1863, i, 53. Verdier et Cattois, *Arch. Civile, etc.*, 4to., Paris, 1852, i, 65, 75, 80, 151, 155. An altar supposed of Phœnician art found in Malta, has a palmette proceeding out of a pot, carved on each of its four faces; Lenormant in Daly, *Revue Générale*, 1841, ii, 498, pl.

Kinnard, *Athenian Sepulchral Marbles and other Ornaments*, in Stuart and Revett, *Antiq. of Athens*, fol., Lond., 1830, iv, supp., expresses the opinion that this ornament probably originated from Pelasgic artists, but whether from imitation or only from general principles of vegetation had not been ascertained. English architects having applied the word "honeysuckle" to it, the word had been concurred in by foreign artists, as by Millingen, *Vases Grecs*, fol., Rome, 1813, introd., p. 13. Kinnard also considers that at the time of the execution of such decorations in marble by the Greeks, they had no symbolical meaning; that the elemental form is to be traced in the earliest Etruscan and Æginetan art; and may have referred to some portion of oriental idolatry; that the prototype seems to have been forgotten anterior to the Greek age, at which period the decorators appear to have adopted combinations of curves of capricious formation; and that later practitioners approximated by degrees to the imitation of vegetation. He cites Inghirami, *Monumenti Etruschi*, 4to., Fiesole, 1821-26 (*dei Vasi fittile*), v, 21-2, as considering the foliage to have belonged to some species of plant sacred to the object for which the work, on which the foliage appears, was intended. Layard, *Nineveh*, 8vo., Lond.,

1849, ii, 295-8, remarks that the form was either a symbol or an object of worship; and decides that the similarity between the Assyrian and the Greek ornament was not accidental, because (omitting others of his points) both have the honeysuckle (or palmette) alternated with the lotus or tulip, or whatever is the name to be given to the other form of vegetation. This latter ornament was in his opinion (ii, 213) evidently introduced during, or just previous to the period of the builders of the



LATER GREEK HONEYSUCKLE ORNAMENT



ASSYRIAN ORNAMENT (NIMROUD)



ASSYRIAN ORNAMENT ON THE ROBE OF A KING.



EARLY GREEK HONEYSUCKLE ORNAMENT



ASSYRIAN ORNAMENT (NIMROUD).

works at Khorsabad (about 734 or 721 B.C.). In Assyrian work the simple palm becomes a tree bearing many flowers; in the later monuments, the flowers at the ends of the branches are replaced frequently by the fir or pine cone, but sometimes by an ornament or fruit resembling the pomegranate, that was connected in some way with the service of Rimmon. LAYARD, *Popular Account*, 1851, p. 96, and cut p. 45, calls it a seven-petalled flower, noticing its use in embroidering a dress. SMIRKE, *Remarks on the Style of Ornamentation prevalent in the Assyrian Sculptures*, read at Royal Inst. of Brit. Architects, 18 March 1850, observes that "the honeysuckle ornament so abundantly used is nowhere, I believe, seen in early Egyptian work."

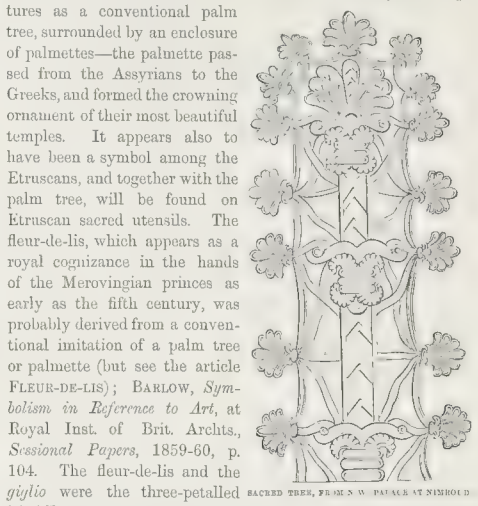


FLOWER OF THE TULIP OR LILY (KOUTOUMJIK).

It yet remains a question whether the plant translated pomegranate, in the English translation of 1 KINGS vii, 42, and EXODUS xxviii, 33, would afford any clue to the species of the missing plant. The mediæval FLEUR-DE-LIS assumed in some cases a form that might be supposed to have been derived from the same source as some examples of the FLEURON, honeysuckle, or palmette. On p. 53 of the Supp. volume above mentioned, the honeysuckle (or palmette) and the acanthus are called lotus and parsley, by DONALDSON; while, on p. 56, the plant of a sort of Corinthian capital is called a honeysuckle of varied composition, that word being used in the present technical sense instead of lotus as previously. KINNARD, *ut sup.* referred to a possible interpretation of XENOPHON, *Anabasis*, 5, iv, 32, and considered that the true Greek name for this ornament might have been *ἀνθέμιον*, which according to the interpreters of THEOPHRASTUS was the Melanthium sylvestre or Nigella Damascena, wild gith or fennel-flower, to which the name ANTHEMION is said to have been applied from the beauty of its *ἄνθος* or flower. IMBREX. IONIC ORDER. LEAFAGE.

The varied palmette and lotus are found used at Samos and Priene; INWOOD, pl. 26: and the palmette and lotus at Samos, at the temple of Minerva Polias, the Erechtheum, and at Bassæ: and two varieties from Delphi, in STUART, etc., iv, 54, 56, pl. 1-6. HOGG, *On the Origin of the Floral Ornaments, the Ionic Volute, and the Wave Line of the Ancient Greeks*, in ROYAL SOCIETY OF LITERATURE, *Trans.*, 2nd Series, ii, 1847, p. 179-93: and *On Acræ*, in FALKENER, *Museum of Classical Antiquities*, 8vo., Lond., 1851-2, ii, 240.

The sacred tree, the Tree of Life, occurs on the Assyrian sculptures as a conventional palm tree, surrounded by an enclosure of palmettes—the palmette passed from the Assyrians to the Greeks, and formed the crowning ornament of their most beautiful temples. It appears also to have been a symbol among the Etruscans, and together with the palm tree, will be found on Etruscan sacred utensils. The fleur-de-lis, which appears as a royal cognizance in the hands of the Merovingian princes as early as the fifth century, was probably derived from a conventional imitation of a palm tree or palmette (but see the article FLEUR-DE-LIS); BARLOW, *Symbolism in Reference to Art*, at Royal Inst. of Brit. Archts., *Sessional Papers*, 1859-60, p. 104. The fleur-de-lis and the *giglio* were the three-petalled iris (*Handbook to Italy*, 1846, p. 506). The departure of eastern art from the Assyrian type is marked in the example at Allahabad dating about 2500 B.C., and given by FERGUSSON, *Illust. Handbook*, 8vo., Lond., 1855, p. 7: also in LAYARD, *Nineveh*, 1849, ii, 295. LILY.



SACRED TREE, FROM N.W. PALACE AT NIMROUD



The insertion of these eight woodcuts, from the publications by LAYARD above quoted, is owing to the liberality of Mr. John Murray, the publisher of the works, who has kindly contributed them.

PALMSTEDT (.....), architect to the city of Stockholm, designed 1776 the exchange, on the first floor of which is a large saloon for concerts, etc.; and 1788 the *packhuset* or custom house. EKMARCK, *Guide—dans Stockholm*, 8vo., Strengnäs, 1830, p. 261; 324.

PALMYRA. The Heb. *Tadmor*, City of Palms, built or enlarged 10th century B.C. by Solomon, king of Israel, and about 130 A.D. called Hadrianopolis. It is a place in the pashalic of Damascus in Syria, now represented by about fifty hovels built in the court of the temple. The ruins extend for nearly one and a half miles, and are apparently of buildings of the first three centuries of the Christian era; they are in a style of art, vitiated in almost every profile, similar to that at Baalbec. This, the celebrated city of queen Zenobia, was taken by Aurelian A.D. 272: Diocletian (284-304) added buildings, and Justinian (527-565) erected the walls now existing. The edifice supposed to have been the temple of the Sun is situated at the eastern extremity of the city, in a court about 720 ft. square (730 ft. by 715 ft. externally; FERGUSSON), encompassed by a wall 70 ft. high, round which was a double colonnade, except on the west side, projecting 52 ft. where it was single, each pillar of which had a bracket for a statue about one-third up the shaft; nearly 100 columns in various places remain *in situ* (KONKOBAR). The entrance 138 ft. long was on the west side, having three doorways, the central one of which is 32 ft. 6 in. high, by 15 ft. 9 ins. wide, its sides and lintel being monoliths richly sculptured. The *naos* is placed north and south, with four doorways to the east, and five to the west, the middle one being about the same size as in the portico of 10 coupled columns and opposite to it, but it is not in the middle of the side of the temple, "arrangements probably demanded by some

peculiarities of the ritual belonging to it"; COCKERELL, *The Temples at Ægina*, etc., fol., Lond., 1860, p. 47. The temple is about 200 ft. long, by 110 ft. wide on the top step; the *naos* being 134 ft. long by 63 ft. wide externally; with a peristyle of 38 and two attached fluted Corinthian columns, each about 53 ft. high, having had metal leafage affixed to the bell of the capital (or 40 ft. high and 4 ft. diam., with brazen Ionic capitals, IRBY); the entablature is richly decorated with festoons of fruit and flowers held up by winged genii: the temple was restored by Aurelian (WOOD, p. 13). At each end is a small recess with a monolithic ceiling richly sculptured; that at the north end has the signs of the Zodiac, within which seem to have been the principal deities. Near the temple are four shafts of red granite, one 3 ft. diam. and 30 ft. long. A monumental column 60 ft. high is dated 138. The great colonnade, erected before A.D. 238, starting from a triumphal arch near the temple, consisted of four rows of columns, and extended through the city for about 4,000 ft.; each of the 1500 columns had on its inner side a bracket at about 8 ft. high supposed for a statue; about 150 are still standing; they are 57 ft. high, ("little more than 30 ft." IRBY), including the base and capital. There are two fine mausolea near the west end of the colonnade. A unique building, which had a portico of four columns in front, with wings having five rows of columns, 4 in each row, and the cell 100 ft. long, was erected between 292 and 305. The singular sepulchral towers, more or less perfect, of the Necropolis, occupy a portion of the slope of the hill; they vary from 20 to 30 ft. square, and from three to five stories in height, each forming a chamber, and have flat roofs; but in a few instances they terminate with a stone pyramid. One is a tower 30 ft. square, and about 80 ft. high, divided into 4 stories; it was the family tomb of Elabelos and erected 102. Marble folding doors, panelled, were observed by IRBY to some of the larger tombs in the town. More than 100 others are seen along the mountain side, and appear of an earlier date than the Roman conquest. There are a number of subterranean sepulchres, which are stated to have been built in natural or artificial cavities, and then covered with soil (PORTER). The stone used in the buildings scarcely deserves the name of marble.

PLINY, *Hist. Nat.*, v, 21, gives almost the earliest description of the city, which was plundered by Tamerlane in 1400. HALIFAX, an English merchant of Aleppo, attempted to visit it in 1678, and wrote *Voyage to Tadmor*, 8vo., Lond., 1705. SELLERS, *Antiq. of Pal.*, 1696, and in *Trans.* of the Royal Society. The first account since 1172 (Benjamin of Tudela) was given in the narrative of the English merchants of Aleppo, who visited it in 1691, by HUNTINGTON, in *Phil. Trans.*, xix, 1695: HALLEY, in same work, abr. by Lowthorp, iii, 518. *Antiquity of Palmyra, containing a history of that city and its emperors*, 8vo., Lond., 1705. WOOD and DAWKINS, *Ruins of Palmyra*, fol., Lond., 1753. GIBBON, *Decline, etc.*, 4to., 1781, chap. xi. WITTE, *Ueber—der pyramiden, Persepolis und Palmyra*, 8vo., Leipzic, 1792. CASSAS, *Voyage Pitt. de la Syrie*, fol., Paris, 1798, 111 pl. VOLNEY, ii, chiefly from WOOD's publication. IRBY and MANGLES, *Travels in Syria, etc., in* 1817-18, 8vo., Lond., 1823. ST. MART, *Hist. de Palm.*, Paris, 1823. LABORDE, *Voyage en Orient.*, fol., Paris, 1838. ADDISON, *Damascus and Palm.*, Lond., 1838. WADDINGTON visited it in 1861. MYERS, *Remains of Lost Empires*, 8vo., Lond., 1875, p. 31. PORTER, *Giant Cities*, etc., 8vo., Lond., 1867, p. 321-335.

Inscriptions were copied 1678 by HALIFAX as above. BERNARD and SMITH, *Inscrip. Græcæ Palm.*, Utrecht, 1698. WOOD, as above. GIORGI, *De Inscrip. Palm. quæ in Museo Cap.*, Rome, 1782. BARTHÉLEMY in *Mem.* de l'Academie des Inscr., xxiv and xxvi. SWINTON, in *Phil. Trans.*, xlviii. SILVESTRE DE SACY, 1792. DE VOGÜÉ, 1869, gives one hundred and forty-six. 2. 3. 23. 25. 28. 50. 78. 96.

PALMYRA or PORCUPINE WOOD, is used in veneers and inlaying. It is a fine prettily speckled wood obtained by cutting transverse sections chiefly of the Cocos nucifera, the Cocoa-nut palm; the pieces are consequently very small. ARCHER, *Economic Botany*, 12mo., Lond., 1854, p. 331.

PALMYRAH PALM; BORASSUS flabelliformis. It is very abundant, and is grown in perfection in the province of Jaffna in Ceylon, especially in sandy tracts near the sea. The wood, which is almost black, is used all over India for rafters, as it resists the attack of all insects, and is extremely durable. This tree is called by the Hindus *Tal* and *Tar*, whence its sap is named *taree*, which is fermented into a spirit. Its leaves are made into fans and punkahs, and are also used in thatching. The tree often looks as if growing out of the middle of the *Ficus indica* or Banyan tree; the seeds of the latter carried to the former by the birds, and germinating on the leaves and spathes send down roots, which in course of time encircle the palm. To the notice of this tree s. v. BORASSUS, it may be added that the Jaffna palmyrahs of Ceylon are famous, and were largely imported into Madras in former times. It splits easily in the direction of the length, but supports a greater cross strain than any other wood. Iron nails rust in it rapidly: BYRNE, *On the Use of the Timber of the Palmyra Palm in the Construction of Bridges*, INSTITUTION OF CIVIL ENGINEERS, 1862, and printed in CIVIL ENGINEER, ETC. *Journal*, 1863, xxvi, 20, who states that this palm grows in the north of Ceylon, to a height of 60 ft., with a nearly uniform thickness of 10 ins. Its power of resistance to a transverse strain is as compared with teak 9 to 8. A well-grown tree would yield a pile 30 ft. long, requiring only to be stripped of its outer integuments, and pointed to fit it for use. Bridges of this timber had stood for 16 years without requiring any material repairs, and he thought that in the most unfavourable situations it might last 25 years, after which portions might be reused. The wood appeared to be proof against the teredo, and a coating of tar prevented it from splitting from exposure to the sun. 14.

PALO. The ancient ALSIUM, on the coast of Tuscany in Italy.

PALOMBINO MARBLE. See DOVE MARBLE. 6.

PALOO. A hard, fine, close grained, heavy wood, of Ceylon. The heart-wood is a deep red brown in colour, and the recent layers reddish yellow; its compact, even structure renders it admirably adapted for turnery work. 71.

PALTRINIERI (ANTONIO), born 3 July 1654, at Sassuolo in the state of Modena, son of Giambatista, was also a painter. He designed the theatre at Sassuolo; the tribune of the church of S. Giorgio; and the façade of that of the Servites, now the conventualists. He died in August 1717. 93.

PALUSTRINE DWELLINGS; see LACUSTRINE DWELLINGS.

PAMANT, PAMMANT and PAMMENT. This word is considered to be a corruption of pavement, and is in common use in East Anglia. "Nine inch pammant-pavement, at 2s. 6d. per yard", occurs in SALMON, *Vade Mecum*, 1735, p. 66; 1755, p. 49. The Suffolk pamment brick is half the thickness and double the width of an ordinary brick, that is, about 2 ins. thick, and 9 ins. square.

PAMIERS, Pomiers, or Parmiers (Latin *Apamia;* in Mid. Ages, *Fredelas* or *Fredelatum*). A town in the department of Ariége in France, formerly the capital of Foix, and situated on the river Ariége. It is the see of a bishop. The cathedral dedicated to S. Antoine (bishop) is said to have been designed by Mansard in the seventeenth century, who preserved the old Gothic octagonal brick tower. There are seven other churches; and the collégiale Notre Dame du Camp, which is crenelated and machicolated with two pentagonal towers also crenelated: and a very large hospital. NODIER and TAYLOR, *Voyage Pittoresque* (Languedoc), fol., Paris, 1833-42, ii, pt. 1, which also gives views at Foix, Mirepoix, and of Allet abbey. 14. 28. 50. 96.

PAMPELUNA; see PAMPLONA, in Spain.

PAMPINATA. A designation given to those vases ornamented with the leaves of the vine, from Lat. *pampinus*, a vine leaf, or from *pando*, to spread, in allusion to the shape of the leaf. 6.

PAMPLONA (Anc. Pompelon, perhaps from Pompeiopolis; Engl. *Pampeluna;* Fr. *Pampelune*). The capital of the modern province and ancient kingdom of Navarre, and situated on the river Arga, over which there are six bridges. It was rebuilt by Pompey B.C. 68; and destroyed A.D. 778. The citadel, constructed after that at Antwerp, was strengthened 1521 by Pedro de Malpaso (also said by P. Machuca), enlarged 1539 by el maestre Bernart; 1551; and 1592 by J. and J. Palearo called *los fratinos*. The cathedral (Gothic), sacred to the Assumption of the Virgin, is small, but has five ailes, and dates from 1397. The façade is of Italian architecture. The *chevet* is entirely devised upon a system of equilateral triangles. The stalls in the *coro*, of Renaissance character, carved by Miguel Ancheta, who died after 1578, and before completing them, are reckoned amongst the finest in Spain; they are one hundred in number, and of English oak. There are double galleries: the façade (Corinthian) 1783 is by V. Rodriguez. Part of the south cloisters of the former church and the chapter house, *cir.* 1100, remain; with the refectory (13th cent.), kitchen and offices, of the Augustinian monastery. There are four parish churches, of which S. Saturnino (of the middle of 14th cent.) is remarkable for the very unusual planning of its eastern end, and for a groined western gallery; and S. Nicolas, which is Romanesque. There are also a number (9) of convents mostly used as barracks, military hospitals, or schools; a large general hospital; the *casa del Ayuntamiento* rebuilt since 1841; a *plaza de toros* holding 8000 persons; a fine arcaded *plaza;* and many fine family houses denoted by their heraldic shields. The fountains are well supplied from an aqueduct nearly 12 miles long, by V. Rodriguez about 1783, carried through tunnels for upwards of 3 miles, and in one portion, 2,300 ft. in length, it has 97 arches, 35 ft. span, and 65 ft. high. Escosura and Villa Amil, *L'Espagne Artistique*, fol., Paris, 1842-59, iii, which gives the staircase, the portico of La sala preciosa, the door, etc., of La Barbarana, and the door del N. S. del Amparo, all in the cloisters of the cathedral. Street, *Gothic Architecture in Spain*, 8vo., Lond., 1865, p. 402, gives a plan of the cathedral and of the church. 50. 28. 66. 96.

PAMPRE. A French term used for a carved ornament composed of vine leaves and of bunches of grapes, with which the hollows of the circumvolutions of twisted columns are sometimes decorated. This ornament is also observed in the hollows between the shafts of doorways in the Decorated period of mediæval architecture, as at S. Mary's abbey, York. 2. 6. 25.

PAN. The god of shepherds, of huntsmen, and of all the inhabitants of the country. He was worshipped particularly in Arcadia, and throughout Egypt. He is represented with a tail, horns, and cloven feet, like a goat; and a star decorated his breast. His figure is usually represented naked to express agility. He was the emblem of fecundity, and was regarded as the principle of all things. On a gem in the Strozzi collection, Pan's face appears very terrible; and probably it was from some of the horrific representations of this god that modern artists may have borrowed the idea of a demon. It is from his character as the inspirer of sudden frights and fears, that the term "panic" is derived. Pan ranked as one of the three youngest deities worshipped by the Greeks. The satyrs are his attendants. A frieze or parapet on the quay at Aizani has a continued garland dependent from a figure of Pan, or a faun with a mask of a satyr and of a nymph alternately over the swags; it is given in Texier, *Asie Mineure*, fol., Lond., 1839-49, i, pl. 36. 6. 14.

PAN. The stoneware receptacle used in a common water-closet, attached to an S trap for entering the drain, with a nozzle or junction at the top of the pan for connecting it with the pipe for the supply of water. Its form varies.

In a *pan closet*, the receptacle, a blue, white, or coloured basin, has a metal pan, worked by levers, to shut up the opening at the bottom of it, and to contain water to prevent foul air ascending into the room. This basin is fixed to a metal receiver called a "container", in which the pan works, and which communicates by a pipe with the lead D trap, and thence with the drain. A *valve closet* has a valve in lieu of the *pan*. This valve is made partly of metal, or of vulcanised india rubber and metal combined, according to the invention of the maker; and both it and the pan work by "supply valves", "regulators", and other modern contrivances. Some architects get rid of the "container", and consider the best apparatus to be that with the elastic valve.

Hellyer, *The Plumber and Sanitary Houses*, 8vo., Lond., 1877, p. 76, 80, points out the grave objections to this form of closet; and the model bye-laws issued by the Local Government Board for the use of Sanitary authorities, 8vo., 1877, iv, New Streets and Buildings, sec. 69, p. 37, expressly prohibit the construction or fixing under the pan, basin, or receptacle of any water-closet, any "container" or other similar fitting.

PAN. The Lancashire term for a purlin. Pan piece

PANAMA. A city in New Granada, Central America: fortified 1587-95-1609-22. The buildings are mostly in the old Spanish style, the larger ones having *patios*. The cathedral is dedicated to the Virgin; there are also a parish church, five convents, a nunnery of Sta. Clara, an hospital, a college, and a grand public piazza. The site of the old city of the same name is about three miles east from the present one. Ulloa, *Voyage to S. America*, 8vo., Lond., 1772, i, 113, etc. 14. 50. 66. 96.

PANATHA, a Laurus. A wood of Tavoy, East Indies: is used in house carpentry. 71.

PANCARPI. (Gr. *πᾶν*, all, and *καρπος*, fruit). The term including the crowns, garlands, festoons, etc., made of all sorts of fruits, flowers, and leaves, which are represented as ornamenting parts of buildings; as at the Pantheon at Rome. 1. 2. 6.

PANCHARD (.....), designed 1511 the church of May in the arrondissement de Meaux, of which the south aile and the tower were built at this period. Comité Historique, *Bull. Arch.*, ii, 44.

PANDINO (Lorenzo). Designed 1292 the palazzo de' Giureconsulti at Brescia, formerly on the site of the scuole elementari maggiori femminili. Zani, xiv, 249. 57.

PANDOXATORIUM. The late Latin term for a brewhouse. *Durham Inventory*, 1446. Surtees Society, *Inventories, etc., of Finchale Priory*, 8vo., Newc., 1837, p. 299.

PANDRETHAN. A town in the Himalayas, in which the characteristics of the style noticed s. v. Naga, and Indian architecture (p. 22), is clearly exhibited. The temple erected 1000 stands yet in the middle of its tank. Cunningham; given in Fergusson, *Indian Arch.*, 1876, p. 294.

PANDROSEIUM. Pandrosos, one of the three daughters of Cecrops, connected with the legend of Erectheus. The name given to a temple of small dimensions situated in contiguity with that of Minerva Polias, and thus forming with it the "double edifice" of Pausanias, known as the Erechtheum, on the Acropolis at Athens. By some who thought the edifice also contained a temple to Erectheus the name was occasionally applied to the southern projection or portico of the Caryatides or Canephoræ. It is also said to be the western apartment of the Erechtheum, to which the projecting portico on the northern side gave access: as shown in the woodcut s. v. Humerus. Tetaz, *Revue Archéologique*, 1851, in an elaborate study of the remains (illustrated by most careful drawings, the result of long and patient labour on the spot), allocates to the Pandroseium the cella or interior of the edifice approached from the northern portico; the eastern portico and temple being by him attributed to Minerva Polias. Fergusson, *On the Erechtheum*, Roy. Inst. of Brit. Archts., *Sessional papers*, 1876, p. 139-158; and Suppl., however, places the Pandroseium beyond the western wall of the temple, and near to the house of the Canephoræ, within the Temenos. Inwood, *The Erectheion*, fol., Lond., 1827; Beulé, *L'Acropole, etc.*, 8vo., Paris, 1868. Erechtheum, s. v., Athens, p. 117.

PANDU KOLI. The name in Hindustan for the circles of

unhewn stones, identical in every feature with the so-called Druidical circles of Europe, except that their dimensions are smaller, their diameter being generally about from 10 to 20 ft. As far as has been ascertained, they were nearly always burying places, which seems also to have been generally the case with the circles in Europe: FERGUSSON, *History, etc.*, 8vo., Lond., 1867, ii, 473.

PANE or PANEL. (Fr. *Pan; panneau*). A compartment or space. Hence each face of a building, of a cloister next the garth or court, was so called. A pane of glass, called "lozen" in Scotland, is a common use of the term; but the difference, if any, between it and "square of glass" (Fr. *carreau*) is unknown. A "panell of stained glass" to be filled with the image of S. John, occurs in *Rot. Kemp.*, as given in GLOSSARY OF ARCHITECTURE. "Item xl panell vitri parvi valoris, precii 6s. 8d.", occurs in 1399, in SURTEES SOCIETY, *Fabrick Rolls of York Minster*, 8vo., Durham, 1859, p. 18, 348. A piece of anything in variegated works, as a pane of cloth, a counterpane, shows its further use. 19. 22.

The name panel is also given to the three rails with the pales nailed on them of a fence, as it can be moved at once when any alteration in it is required. 14.

PANE DRAWING, improperly written PAIN DRAWING. A term derived from the resemblance to a window pane. It is the finish to the open spaces of a timber framed building, which are frequently filled in with a rough material, and then *drawn*, (a provincial term for plastering). In many ancient examples an embossed pattern was impressed upon the surface while the mortar remained moist. The modern application is chiefly to the underside of plaster floors where the joists are exposed to view. S. J. B.

The term is also applied to the plastering of the spaces between the exposed rafters of open timber roofs. PARGET WORK.

PANEL. A piece of oak, chesnut, white poplar, or mahogany, prepared to receive a painting; canvas being a later introduction.

PANEL, sometimes written PANNEL (Fr. *Panneau*). A surface surrounded by mouldings or channels, or by other surfaces in different planes. In joinery; a thin board having all its edges inserted in the groove of a surrounding frame. In masonry, it is a face generally sunk below the frame around it; but in both it is sometimes made flush with the frame, when it is called a "raised panel", there being a margin or molding between it and the frame: or it may be flush and only marked by a bead or by a groove. When sunk, the angle formed is often filled up with one or more moldings. Thus there is a panelled pilaster; a panelled soffit; panelled tracery: a COFFER, or CAISSON (It. *Riquadratum*) in a ceiling is a sunk panel. BAND. FRIEZE PANEL. LYING PANEL. BOLECTION. Slate, pine, and mahogany have been used for the panels of a room door in good work.

Framings, as doors, partitions, wainscoting, and such like, are named according to the number and finish of the panels, which in most *Price Books* are named and described. BEAD. The art of panelling is supposed, from the ancient bronze doors, to have been known to the Romans, it is also observed in the solid stone doors to the old houses at Bashan in Syria; in modern times the cheapening of nails, screws, and the use of glue, must have given a great impetus to framing. During the mediæval period, panelling became most frequent during the fourteenth and fifteenth centuries. It covered the face of the wall with vertical tablets headed with arches of open foils, and divided by a horizontal fillet of two or three lights, enclosed in a square. So predominant was this manner, that it pervaded the walls externally and internally, so that the doors and windows are pierced panels only, flowered, cinquefoiled, or feathered, *i.e.*, having the external lines repeated: frequently spread over the whole surface of the building; DALLAWAY, *Discourses*, 8vo., Lond., 1833, p. 173. During the reign of the last Henry and of Elizabeth the walls of apartments were lined with panelled wainscoting, and the "napkin panel" and "linen pattern" were introduced. 19. 22.

PANEVAPAH WOOD; maha nambo; red wood. A wood of Orissa in Hindustan. 71.

PANE WORK. The division between the timbers in half-timber construction. PANE DRAWING..

PANIBERGA. The ancient name of BAMBERG in Bavaria.

PANIGAROLA (OTTAVIANO), 26 May 1519, was "deputato alla fabrica, ed intendente di architettura", perhaps a supervisor, at Milan Cathedral. 27.

PANIZZA (ALVISE), of Venice, lived in the seventeenth century. 26.

PANJIM, or New Goa; see Goa, in Hindustan.

PANLOUN. A close grained red wood of Tavoy, East Indies, used for building. 71.

PANNO DI MORTE MARBLE. A black marble with a few white fossil shells. NERO ANTICO.

PANOPOLIS. The modern name is Achmin, Akhmin, or Ekhim; see CHEMMIS, in the Thebaid in Egypt.

PANOPS. The Ionic temple on the river Ilissus near Athens, is now considered to have been a temple to this nereid. It no longer exists. The details are given in STUART, *Antiq. of Athens*, fol., Lond., 1762, i, chap. 2. IONIC ORDER. This building has also been called a temple to Ceres, and with more probability to Triptolemus.

PANOPTICAL PRINCIPLE OF INSPECTION. By means of this principle a single person becomes competent to undertake the supervision of a large number of subordinates, he being placed in a central position to which all the avenues of the buildings radiate. Plans are given in Jeremy Bentham's *Works*, iv (*Panopticon, or the Inspection House*, 1791, written partly in 1787), who refers to his brother Sir Samuel Bentham, brigadier-general, as the originator of the system about 1787; who prepared plans about 1791 for a panopticon for 1000 convicts, but it was abandoned. Early in 1797 a building on the system for 10,000 prisoners of war was also abandoned. He planned several naval seminaries under earl Spencer's administration, but these were also given up on a change of ministry. During this period the plan and details were furnished to the emperor of Russia; and in 1805 Sir S. Bentham was sent on a mission to that country, where he designed a panopticon school of arts, at Ochta near S. Petersburgh, consisting of a central part upwards of 100 ft. diam., with which were connected five rays each 100 ft. long; it was covered in by 1807, but having been erected of timber, the whole was destroyed by fire some years after. A plan for the renovation of Sheerness dockyard was made by him 25 Feb. 1812, and given, with further details of the principle, in the CIVIL ENGINEER, ETC., *Journal*, 1853, xvi, 453-5. The general form of the panopticon at Ochta has been frequently adopted, but its chief merit, the principle of inspection, has been neglected. Thus the Penitentiary in Cold Bath fields, London, by C. Middleton 1788-94, and published, has its central buildings and rays, but there is no central or other spot from whence a view can be obtained of the whole interior. One instance where it has been adhered to is at the Dundalk County prison, designed by John Neville, a plan of which is given in the same *journal*, p. 121.

The castle at Chester is said to have been the first prison built on this principle in England, 1793-1820, by J. Harrison. The Dartmoor prison erected before 1810 for 6000 prisoners of war, was partly planned on this principle; ACKERMANN, *Repository of Arts*, etc., iv, 161. The Pentonville or Model prison for 520 prisoners on the separate system, was designed 1840-42 on this principle by major J. Jebb, surveyor-general of prisons: a description of it was published 8vo., 1844: and a cut of the airing yard is given in the PENNY CYCLOPÆDIA, 1844, xxv, p. 153: also s. v. Bentham and Prison. The *grande prigione* at Palermo 1834-40, by Di Martino, on the model of the Philadelphia penitentiary; the central part of the vast albergo de' Poveri at Naples begun 1751 by F. Fuga; are all on the same principle.

PANORAMA (Gr. πᾶν all, and ὅραμα view). The exhibition of a picture circularly disposed round the interior sides of a rotunda, in the middle of which the spectator is placed upon an elevation and under cover, in such a manner as to enjoy, in all directions, the view represented before him. The Germans attribute the invention of the panorama to Johann Adam Breysig of Dantzig, as in *Journal des Luxus und der Moden*, 1800, p. 642 (NAGLER, s. v.), but it is acknowledged to be the invention of Robert Barker, who died in 1806. In 1788 (1793 is sometimes stated) he exhibited at Edinburgh a view of that city, being the first picture of the kind. He then commenced similar exhibitions in London, having adopted the word "panorama" to attract notice, and erected about 1792 or 1794 the building in Leicester Square, designed by R. Mitchell. It was 90 ft. diam. outside, 85 ft. inside, and 57 ft. high inside; the upper picture was 50 ft. diam. It is engraved in his *Plans, etc.*, fol., Lond., 1801. The exhibitions were continued by R. Burford, assisted by H. C. Selous. It was shut up at the end of 1863, and has since been converted into a church. Another similar building was erected in Kentish Town (now Rochester Place, and occupied by — Willis, organ builder), in which the pictures were painted. The largest panorama was the view of London exhibited at the Colosseum in the Regent's Park, which building was designed for it by D. Burton 1824-29, for Thomas Horner, who had painted the view 1822-24: the edifice, about 125 ft. diam. inside, was pulled down 1876-77; it is described in BRITTON and PUGIN, *Public Edifices of London*, 8vo., Lond., 1828, ii, 271.

In France, this invention was adopted by two Americans, Fulton and James, with the assistance of Fontaine, Prévost, and Bourgeois, artists. A *history of panoramas*, including those of Prévost, Langlois, and the Colosseum, precedes the description of the "Rotonde des Panoramas" in the Champs Élysées at Paris, designed 1838-39 by J. J. Hittorff, 128 ft. inside diam., in DALY, *Revue Générale*, 1841, ii, 500; 551, pl. 27-31; this account was reprinted as HITTORFF, *Descr. de la Rotonde*, 4to., Paris, 1842; and was partly translated and read at Royal Inst. of British Architects, 11 July 1842. The edifice was pulled down in 1855 to make way for the Exposition Universelle, but rebuilt 1860 for Langlois from the designs of Davioud, on a site a little further west than that pulled down, opposite the cirque d'été; it covers an area of 1,760 metres, and has a clear span of 40 metres = 128 ft. Engl. In 1836 there was a movable panorama in Dresden, which was carried from town to town, in the same manner as show booths in fairs. 6. 14. 25.

PANORMUS. The ancient name of PALERMO, in Sicily.

PAN PIECE. The Yorkshire term for a WALL PLATE. TURNER, *Domestic Arch.*, 8vo., Lond., 1851, i, p. 19, states that in the assize of 1189 (London) *panna* is used for the wall-plates laid upon a party wall of stone to receive the posts, etc., of a *solar* or upper story of timber; "and he who giveth the land shall have the clear moiety of the wall, and of the *panna* upon it and build". In a note he adds, "The word in the original Latin is *panna*, which may signify either the joists for flooring, or a wooden superstructure. In its original sense the phrase appears to be confined to wooden roofing;" s. v. DU CANGE. The Yorkshire use of the term would rather show that it means a wall-plate; and the quotation from the Assize agrees with that view exactly. WRIGHT also defines the word *pan* as "the piece of timber in a house which lies on the top of the posts and supports the beams". The Fr. *pan* is applied to the surface of a piece of timber in the direction of its length.

PANSERON (PIERRE), born about 1730 near Provins, France, became a pupil of J. F. Blondel; professor at the école militaire, and was *inspecteur des bâtiments* to the Prince de Conti. He published *Eléments d'Architecture*, 4to., Paris, 1772; *Nouveaux éléments d'Architecture*, 8vo., Paris, 1775-80, 3 vols.; Suppl., 4to., 1787: *Etudes du Lavis*, 12mo., Paris, 1781; *Dessins d'Architecture, lavis par feuilles détachées; Plan général du palais des Tuileries et du Louvre; Recueil de jardins Français; Recueil de jardins Anglais et Chinois*, 51 pl., 4to., Paris, 1783. *Profils d'Architecture*, 4to., Paris, 1787. LANCE, *Dict. Biog.*, 1872. He was the master of J. N. L. Durand. The date of his death is not stated. Le sieur PANSERON, *Grand et nouveau Vignole, ou règle des cinq ordres, etc.*, fol., Paris, n. d. 68. 112.

PANT. A conduit or reservoir; a term used in a grant dated 1451, by which the water of a spring was engaged to be conveyed to the "pant or reservoir" in the market place at Durham; BRAYLEY, *Beauties of England and Wales*, 1803, p. 97, s. v. Durham. The word is still common on the borders of England and Scotland, and denotes the mouth of a well or fountain; and some old erections over conduits in Newcastle-upon-Tyne, are called pants. 19.

PANTAGRAPH; see PANTOGRAPH.

PANTHEON (Gr. πᾶν, and θεὸς, god). A temple or building which under Augustus was dedicated to all the gods. The celebrated monument in Rome, so called, of which Valerius of Ostia is stated to have been the architect, is generally considered to have been erected B.C. 27, with the portico for Marcus Agrippa, according to the inscription upon the frieze, and dedicated to Jupiter the avenger, although some have supposed that he made that addition to the previously erected rotunda, which was an entrance to public baths. The edifice was restored by Septimius Severus 202 and Marcus Aurelius Antoninus, as recorded on the architrave (Agrippa probably added the portico, *cir.* 166, but leaving it unfinished, it was completed by Sep. Severus; PARKER). The rotunda was despoiled of its rich ornaments, gilded bronze work, and statues, by the emperor Constans II in 663; it was consecrated 608 by permission of the emperor Phocas as a Christian church by pope Boniface IV, under the designation of Sta. Maria ad Martyres, and again 834 by pope Gregory IV to All Saints. Two belfries were added by pope Urban VIII (1623-44), who despoiled the portico of its bronze plates, etc. The rotunda or church is of brick, 142 ft. 6 ins. diam. inside, 188 ft. outside, 148 ft. 4 ins. high from the floor to the outside of the eye of the dome, the thickness at which part may be about six feet, the interior being 142 ft. high in the clear; the eye, which is open, is 27 ft. diam., but somewhat lessened by the projection of its small cornice. GWILT, *Encyc.*, § 2747, notices that each superficial foot of its area lights the astonishing quantity of nearly 3380 cubic feet of the interior. TAYLOR and CRESY, *Rome*, fol., Lond., 1821-2. HIRT, *Osservazione —sopra il Panteon*, 4to., Rome, 1791, accounts for its original formation. ISABELLE, *Les Edifices Circulaires*, fol., Paris, 1843. D'AGINCOURT, *Hist. of Art* (Arch.), fol., Lond., 1847, pl. 1, Nos. 10-14. *Builder Journal*, 1863, xxi, 433-4. The construction of the dome is elucidated in VIOLLET-LE-DUC, *Dict.*; s. v. Voûte; and *Entretiens*, 8vo., Paris, 1858, i, p. 113-7; pl. iii, iv: CHOISY, *L'Art de bâtir chez les Romains*, fol., Paris, 1864.

The name has been given to other buildings, as the church of S. Domenico at Palermo, which contains monuments to many Sicilians who have distinguished themselves in the arts, sciences, law, or literature, also princes, statesmen, and warriors. Such also is Westminster abbey: and the Walhalla in Bavaria, erected by Klenze at Donaustauf near Ratisbon. In Spain, it is a name for a vault or site destined to many burials of one family, as at the Escurial. In Rome, the museo Capitolino, and the palazzo Apostolico di Sta. Maria ad Martyres, have such collections. At Paris, the church of Ste. Génévière was once called the *Panthéon* of France; and that of La Madeleine 1808-43 by Vignon and Huvé was at one time adapted for a pantheon. James Wyatt designed 1771-72, Jan. 22, a theatre in Oxford Street consisting of rooms for public assemblies, etc., and so called. It was burnt 14 Jan. 1792, and rebuilt. It was again rebuilt 1812, and the name of Pantheon bazaar was given to it after the reconstruction of the interior 1834 by S. Smirke. The "pantheon" at Stourhead, the seat (1823) of Sir Richard Colt Hoare, bart., was built after the model of that at Rome, at a cost of £12,000; the portico is of four Corinthian columns; WARNER, *Excursions*, 8vo., Bath, 1801, p. 105. It was imitated by A. Palladio at Maser. The church of S. Francisco di Paola at Naples

1817-24 is an ambitious imitation of this edifice, by P. Bianchi. A Norwegian pantheon was to be erected 1853 at Eidsvold near Christiania (*B. J.*, xi, 491).

PANTICAPÆUM, afterwards Bosporus (Turk. Ghersèti), now represented by Kertch. A town in the Crimea, in Russia, situated on the strait Enikale, between the sea of Azof and the Black Sea. It was founded B.C. 500 by a family of the Ionians, and was the residence and burial place of Mithridates, died 63 B.C. Kertch, obtained by the Russians 1771, is built of stone obtained from the fine quarries of the locality. The church is a curious specimen of Byzantine work, with the date 757 cut on a pillar. The museum, built by the government on the Hill of Mithridates, is an exact copy of the temple of Theseus at Athens, with a flight of steps leading up to it. A large lazaretto was built after 1827. DUBOIS DE MONTPEROUX, *Voyage autour de Caucase, etc.*, 8vo. and fol., Paris, 1839-43, pt. 2, pl. 42; pt. 3, pl. 32; pt. 4, pl. 9-18; v, 113. DEMIDOV, *Voyage Pitt.*, fol., Paris, 1840-7. The characteristic features around Kertch are the immense number of tumuli, varying from 3 ft. to 100 ft. diam., and from 5 ft. to 150 ft. in height. They are mentioned by HERODOTUS; and in them, since the excavations of 1824, specimens of the highest Hellenic art have been discovered. All originals were forwarded to the museum in the Hermitage at S. Petersburg; J. B. ATKINSON, *Art Tour*, 8vo., Lond., 1873, p. 261, etc. The duplicates were kept at Kertch, and were dispersed on the investment of the place by the allies in 1855: some bas-reliefs were sent to the British Museum; BUILDER *Journal*, 1856, xiv, 473, by MACPHERSON, who published *Antiquities of Kertch*, 12 pl., 4to., Lond., 1857. PETTIGREW, in *Journal* of Archæological Association, 1857, xiii, 299-309.

PAN-TILE, or Flemish tile, more correctly PENTILE (Fr. *pente*, bending). A plain tile, having a curved form something like an ∽, used for roofing sheds, and for common or temporary roofing. They are hung on to laths by a knob formed on the tile on the underside near the top. Daniel De Foe introduced the manufacture of pan-tiles at Tilbury in Essex; they had previously been imported from Holland; in his *Review* for March 1705 he states he employed one hundred poor labourers; but the concern did not answer: KNIGHT, *Pictorial England*, 1841, vi, 734. Glazed pan-tiles were brought from Holland, but Barret of Brentford made them as good: LANGLEY, *London Prices*, 8vo., Lond., 1747; 1750.

"All pan-tiles made for sale in any part of England, shall, when burnt, be not less than 13¾ ins. long, and not less than 9½ ins. wide, and not less than ⅝ in. thick"; as specified in the act of parliament 12 George I, 29 Sept. 1722: they weigh about 5¼ lbs. each, making about 47 cwt. per 1000. Pan-tiles are stated to be 10½ ins. across by 14½ ins. in length, but are usually 9½ ins. and 14½ ins.; when laid, the latter shows 8½ ins. by 10½ ins. (1862). Pan-tiles should have a 10-inch gauge, having a lap of 3½ ins., or 10 ins. clear, and as they are generally laid with a side lap of 1½ in., the area of each tile to the weather will be 10 by 8, equal to 80 square ins.; thus 180 go to a square of work: or 150 pantiles to a 12-in. gauge, ten 10-feet pantile laths, and 100 sixpenny nails; (1788). LATH (p. 29). GWILT, *Encyc.*, §2321, gives a *Table* of the number required to cover any area from 1 to 10,000 feet, at 11, 12, and 13 ins. gauge, but the size of the tile is not noted, probably 10½ by 14½ ins.

The Bridgewater double roll tile, which resembles two ordinary pan-tiles in one, is 16½ ins. across, 14 ins. in length, and from ½ to ⅝ in. thick, with a rise of 1½ ins. at the curves: each weighs about 8·80 lbs., and has three stubs at the back to catch the laths; the tile laps over two inches.

PANTILIATE (DAMIANO DA), 21 Nov. 1406, was distinguished as *magister a lignamine* at Milan cathedral. 27.

PANTOGRAPH, PANTAGRAPH, and sometimes improperly called Pentagraph. An instrument employed in copying maps, plans, and other such drawings; or for reducing or enlarging them in any given proportion. The one most commonly used consists of two long bars or rules, and two shorter ones, jointed together, with a tracing point on each long bar. A later (1840) invention is a square frame jointed at each angle with a middle vertical bar, also jointed to the top and bottom bars of the frame. A simple machine is given in BUILDING NEWS *Journal*, 1875, xxvii, 124. STANLEY, *On Drawing Instruments*. Napier's Universal Tracing Instrument is described in SOCIETY OF ARTS, ETC., *Transactions*, 8vo., Lond., 1820, xxxvii, 64, and plate 5. EIDOGRAPH. APOGRAPH. 1. 2. 5. 14.

PANTRY (from Fr. *pain*, bread). In the fourteenth century the BUTTERY and the pantry were often the same room; they are described in ancient "accounts" under the name of *celarium* or *dispensarium;* at others under the *panetria* and *botellaria*—the one for the distribution of bread, the other for wine; they also contained the cups and platters, bowls and salt cellars, cloths, towels and napkins, casks and vessels, and miscellaneous implements. The *celerarius*, to whom the care of these two chambers was confided, was an officer of much importance in the household. SURTEES SOCIETY, *Finchale Priory*, 8vo., Newc., 1837, gives at dates 1311 and 1360 lists of articles enumerated in pantries. TURNER and PARKER, *Dom. Arch.*, 8vo., Lond., 1851-9, ii, 135-8. The pantry is now a large closet wherein plate, glass, china, etc., are placed for use and store, and in which cooked provisions are often kept.

The butler's pantry should be placed as near as possible to the dining room for the convenience of service: it should be removed from general traffic, and especially from the back door, for the safety of the plate; the communication with the wine and beer cellars must be ready: it should be near the housekeeper's and steward's rooms; and will be best about 12 ft. or 14 ft. square, or more. The fittings are mentioned s. v. Butler's pantry. When the plate is of much value, it is usual to attach to the pantry a fire-proof safe or room; sometimes warmed to expel damp. A plate scullery, for cleaning plate, in large establishments, would open out of the pantry, and have two sinks and a dresser. The butler's bedroom, whereby to guard the plate at night, should adjoin the pantry; sometimes a closet bedstead can only be provided in the pantry itself. In larger establishments this charge of the plate devolves upon the under butler, and then a second private room, close by, has to be provided for the chief. Where no man servant is kept, a small pantry has to be contrived on the same principles: KERR, *Gentleman's House*, 8vo., Lond., 1871, 3rd edit., 221-3.

PAOLETTI (NICOLO MARIA GASPARO), of Florence, restored the palazzo imperiale at Poggio near Florence, in which he removed an arched ceiling, 22 ft. long and 12 ft. wide, painted by M. Rosselli, to a new position with safety, 13 April 1773; on which the grand duke Peter Leopold of Austria gave him a present of 100 gold sequins and a like sum to the workmen. ANGUILLESI, *Not. Storiche dei pal.—Toscana*, 8vo., Pisa, 1815, p. 93. He restored and embellished 1780 the palace at Fiesole, now called Villa Mozzi, erected by Michelozzo for Giovanni, son of Cosimo de' Medici; (MASSELLI). He also reduced to form the casa Rucellai, now Dofour Berti, at Florence; where he altered, with G. del Rosso, the ospedale di S. Matteo (designed 1384 by L. Baldoni) for the accademia de' Belle Arti. He published *Raccolta dei disegni delle fabbriche regie de' Bagni di Montecatini nella Valdinievole*, 14 pl., fol., Fir., 1787: died in 1813, and was the last person buried in the chapter house or church of the Nunziata at Florence (during the French domination). ROSSO (G. del), *Vita di N. M. G. Paoletti*, 8vo., Flor., 1813, a work not seen by the writer. VASARI, *Lives*, edit. 1850, i, 506, and v, 115. 3.

PAOLO, SAN, or more properly S. PAULO. A town situated on the plain of Piratininga, in Brazil. It was founded 1552; and has wide streets with houses of two floors built of *taipa* work, that is, the walls consist of two rows of posts, filled in with earth. Over the two small streams, the

Tamandatahy and the Inhagahahy, are three stone bridges. It was made a bishopric in 1746. The large palace of the governor was formerly a college of the Jesuits; the palace of the bishop, the convent of the Carmelites, the cathedral, the church of Sta. Efigenia, and other churches, are also large. HENDERSON, *History of Brazil*, 4to., Lond., 1821, p. 180. 14.

PAONIUS, see PÆONIUS of Ephesus.

PAPA. A town in Thither Danube, in Hungary. It has a Greek cathedral with two towers, built with immense blocks of stone, an old and a new castle, the latter fine and with good gardens, two monasteries, a court house, and colleges. 50.

PAPA (GENNARO), completed 1758 the church of SS. Filippo e Giacomo, at Naples. 95.

PAPANTLA. In the northern part of Vera Cruz, near the river Tecolutla, and about six miles from the great Indian village of Papantla, are the remains of a great city, situated in a thick forest, and discovered about 1816. The chief edifice is pyramidal, constructed of immense blocks of sandstone laid in mortar, and the face stuccoed; it is remarkable for its form and finish. It is 80 ft. (or 120 ft.) square, and not quite 60 ft. high. A double flight of 57 steps on the east side leads to the story below the platform: six stages and part of another are visible. The faces of each story are decorated with sculpture, and with a number of square niches, of which there are 366, and 12 more between the flights of stairs, the first story having 24 niches on each side, the second 20, and 16 in the third. HUMBOLDT, *Atlas pitt.*, fol., Paris, 1810. WALDECK, *Voy. pitt. d'Yucatan*, fol., Paris, 1838. GAILHABAUD, *Monumens*, 4to., Paris, 1852, iv. NEBEL, *Voy. Pitt. dans le Mexique*, fol., Paris, 1836. 1. 50.

PAPAW TREE; see ANONA palustris; and CARICA. 14.

PAPARELLI (FRANCESCO), of Lombardy, designed the church of S. Salvatore in Campo, near that of S. Lorenzo in Damaso; with Vincenzo della Greca designed the church of S. Caio, erected in memory of pope Urban VIII (1623-44); and the church of Sta. Maria Traspontina S. Angelo, for the Carmelites, by order of pope Pius IV (1560-66), erected in the pontificate of pope Sixtus V (1585-90): O. Mascherino designed the façade, begun by G. S. Peruzzi, the son of B. da Siena. 111.

PAPELARZ (MICHEL). In the cathedral of Chalons-sur-Marne is a tomb of the 13th cent., on which is a figure similar to that of Libergier, architect, at Reims. The inscription which partly remains reads CI GIST MICHIES LI PAPELARZ.....L'AN MCCLVII..... He was probably the architect of the church Notre Dame, and probably also of a great part of the cathedral of S. Etienne, both at Chalons. A little below the tomb is another figure, of a young man beardless as Libergier, and in a similar costume; it may be a son of Michel; PARIS, Comité Historique des Arts, etc., *Bulletins*, 8vo., Paris, 1842-3, ii, 189-90

PAPENSTEEN or DARDELING BRICKS; see ANTWERP.

PAPER. A material made from fibrous matter reduced to pulp in water; it was first discovered by the Chinese about 95 A.D. Matthias KOOPS, *Historical account* of the *substances used in making paper*, 8vo., Lond., 1801, p. 167, states "that the art of making it from *cotton* was only imported into Europe in the 11th century, but that it had been known and practised by the Chinese, Persians, Tartars, and Arabians for some three centuries (or more) earlier"; at pp. 176-7 that "it came into use in France shortly after its invention, but at what period it was introduced into England cannot be ascertained with accuracy"; and he adds "that the material was gradually supplanted by *linen* in 1342". Of late years straw, pulped wood, and other things, have been experimented upon, but from 1860 Esparto grass established its claim as an abundant source of fibre. Paper is hand-made, rough and hot-pressed; and machine-made. EGGER, *Le papier dans l'Antiquité et dans le temps moderne*, 1866. 14.

Various papers are used for *drawing* purposes; as imperial 30 in. by 22 ins., double elephant 40 by 27, antiquarian 53 by 31, etc. Continuous cartridge 52 ins. wide; and mounted on holland or on union, 26 ins., 39 ins., and 52 ins. wide. Parchment cloth for detail drawings, opaque 33 ins. wide, and transparent 38 ins. wide. Indestructible cloth for diagrams. Sager's patent vellum cloth, 28 ins. and 41 ins. wide. Section drawing, and tracing, papers, and tracing linen. Carbonic or black-lead paper.

White LINING PAPER is used for covering walls before the wall papers of the best qualities are hung, to obtain a good ground for it: it is also used for sketching and drawing full-sized details, etc.: a thicker quality, or "brown paper", for covering canvas on walls and partitions: the latter also for laying on floors before the carpet is put down, to keep dust from coming up through the interstices of the boards. PAPER MILL.

PAPER SLAB *for roofing purposes.*— The paper roofs long in use in Russia, and in Uleaborg in Finland, with which the largest houses erected there after the great fire have been covered, are thus made. The roof is made as flat as possible, being one-third of the breadth; the rafters are fixed 3 ft. apart with half-inch boards laid even over them. The paper is laid over it with 2 in. laps and nailed down, the nails being 5 ins. apart, and the scarfs smeared over. On the ridges are laid half sheets doubled up and smeared between, and nailed down and smeared; then $\frac{1}{8}$-in. thick laths are fastened along the scarfs. The whole is then covered with comp. meal trodden down by bare feet. The following year it is to be again smeared and strewn. One or two years after it is to be again done. When the air and sun have corroded the outer and resinous particles, the composition remains, being always durable, and even not to be ignited by fire from without. The *stuff* is composed of tar boiled in a pot as for ships; to 1 barrel of tar add 60 lbs. rosin and $\frac{1}{4}$ barrel of red ochre. At the second and third operations use only one half of the quantity of rosin. The comp. meal is formed of $\frac{1}{2}$ barrel of pounded brick, $\frac{1}{16}$ to $\frac{1}{8}$ barrel of pounded smithy dross, and $\frac{1}{3}$ barrel of common sand well mixed. Before the paper is used, drench it in tar boiled down to the consistency of ships' stuff, spread it out to cool, and pile up for use. (Communication from Christiania, 1857: and said to be allowed by the fire offices there.) M. Porigneaux (Aug. 1859), a paper manufacturer in Belgium, discovered a method of impregnating thick slabs of paper with tar, and thus rendering them impervious to wet, and fit to be employed for roofing. A similar material was made some years ago in this country, but the strong smell of the coal tar with which the slabs were saturated was considered rather detrimental to their extensive use. The prepared slabs of M. Porigneaux are probably free from this drawback, for the Baron de Streille, the Belgian consul general in Greece, has spoken highly of them as employed in that country. Lightness and economy appear to be the principal recommendations of this invention; it is said that a live coal placed on a slab will only cause a smouldering, and not excite a flame. It is some evidence of the success of this invention that the Belgian government have adopted it for the roofing of their powder magazines and railway stations; and it is asserted that a saving of 25 per cent. is effected on every square yard of roofing.—*Bulletin.*

Paper roofs have been occasionally made in England. Sheets of stout paper are dipped in a mixture of tar and pitch, dried, nailed on in the manner of slates, and then tarred again: this roof is waterproof, but very combustible. The paper roof of the riding house at Witton House, Witton, near S. Margaret, Norfolk, says ARMSTRONG, was blown down by a great wind on New Year's day 1779; NORFOLK TOUR, 8vo., Lond., 1829, p. 966. LOUDON, *Account of the Paper Roofs used at Tew Lodge, Oxon*, 8vo., Lond., 1811. "For small outhouses, and such alone, a cheap and comparatively durable method of roofing is made by dipping sheets of coarse paper in boiling tar, and nailing them on boards or laths in the same manner as slates. The whole is then painted over with a mixture of pitch and powdered chalk, coal, or brickdust. This forms a texture which completely resists all kinds of weather, without requiring frequent repair. As the roof is made to rise not more than 2 ins. in a foot, the

quantity of timber required is much smaller than for any other mode. This covering is very similar to the artificial slating manufactured by the late Sir James Wright, which, during the American war, was in great request in the West Indian colonies as a substitute for shingle, not then readily to be obtained:" PAPWORTH, *Rural Residences*, 8vo., Lond., 1818, p. 36. FIBROUS SLAB.

Paper tiles are being manufactured (1868) at Chemnitz in Saxony: they are much cheaper than the ordinary description, are used in all buildings that have lately been erected for the government; and are commonly adopted for roofing sheds, stables, barns, and erections of a temporary character; BUILDING NEWS *Journal*, 1869, xvi, 103.

Waterproofing paper. A solution of oxide of copper in ammonia is made in a tank, and the paper is made to pass rapidly over the surface of the liquid by means of rollers. The paper, after damping, is passed between two cylinders and is dried. The contact of the paper with the liquid is sufficient to give an impermeable coating of varnish; BUILDING NEWS *Journal*, 1875, xxix, 54.

The pulp of common paper is said to have been made *transparent* by causing it to undergo a certain transformation, which professor Schönbein calls catalytic. With this paper made waterproof, perfectly transparent window-panes, vases, and bottles are made, which will not easily break; CIVIL ENGINEER, ETC. *Journal*, 1847, x, 263. PAPER MOULD, see MOULD. PAPER WATER PIPE, see PIPE. Paper wheels, an American invention, is one of the latest (1877) uses to which paper has been put in the industrial arts.

Bielefeld patented *Portable Buildings of Papier-mâché*, described with plates, about 1853; it stated that temporary dwellings and barracks could be put together with less trouble than tents, and prove far more pleasant and healthy; BUILDER *Journal*, 1853, xi, 299. A patent was taken out about June 1856 for the application to various purposes of corrugated sheets of papier mâché or other analogous material; one of the chief purposes being house building: BUILDER *Journal*, 1860, xviii, 191. A paper house by a process invented by Szerelmey is detailed in the MORNING POST, Sept. 8, 1864. The American invention for paper building material has been recently tested in Chicago, with the result, it is stated, of establishing its utility. It is said that a house 22 ft. long, 16 ft. wide, and 14 ft. high, can be covered on the outside for less than 9 dollars; and a house 16 ft. by 22 ft. and 20 ft. high, for 20 dollars; Jan. 1870. *Paper as a Building Material*, in BUILDING NEWS *Journal*, 1872, xxii, 241, from THE ENGINEER *Journal*.

Paper sheathing to iron ships. For some purpose, a vessel in the dry dock at Portsmouth about 1874 had several large sheets of thick and coarse brown paper, similar to that used for the bedding of copper sheathing on wooden vessels, made to adhere by a marine glue to the clean iron plates. After a voyage of some months' duration, when again docked, it was found that grasses, barnacles, and other crustacea adhered everywhere except on the brown paper. A patent was taken out for making the patent prepared paper sheathing: ECHO *Newspaper*, Nov. 24, 1876.

Iron paper. The Bohemian mode of manufacturing the ordinary object of commerce, which is so-called, being a particular kind of sheet-iron, that is extremely thin, flexible, strong, and free from flaws; its manufacture was not known to the Jurors of the Exhibition of Industry 1851 at London, *Reports*, p. 4. "At the Prussian Industrial Exhibition 1852, count Renard, a large proprietor of iron works, exhibited sheet-iron of such tenuity that 7040 square feet are rolled from one cwt. of metal. The pages of a book made of this iron-leaf turn with as much ease as paper. For books in tropical countries, where insects cause such havoc to papers of vegetable production, these iron-leaves may come to be valuable if they can be protected from oxidation. A white ink, permanent without being corrosive, is required to complete the invention. At the offices of the Landore Tinplate works may be seen the thinnest *iron paper* ever yet rolled. It measures $8\frac{3}{4}$ inches by 6 inches, and weighs only 14 grains. It was rolled by Mr. O. Francis, foreman of the mills, out of the charcoal iron in general use at these works;" CAMBRIAN *Newspaper*, March 3, 1872.

PAPERHANGER. The workman who prepares and brings to a proper face the walls and surfaces intended to be papered, by clearcoling, rubbing down, straining canvas, and covering it with lining paper or brown paper, and cutting, pasting, and hanging the painted paper on the walls. Walls already papered are usually, and should be always, stripped, before repapering. He uses a brown or black pencil for lining marble papers in blocks; and provides needle points for fixing gold moldings along the top and bottom of rooms.

PAPER-HANGING. A stained, painted, or printed paper, for covering the walls of rooms. The operation of producing it is by printing, by manual labour, with a coloured carved block or blocks, if on an already coloured ground, or with a cylinder or cylinders, which may be moved by hand or steam power, on a self-coloured paper for inferior qualities, or on an already coloured ground for the better qualities.

Paper-hangings may be divided into three branches; the *flock*, the *metal*, and the *coloured;* and each of these seems to have been invented at a different time as an imitation of a distinct material. The *flock*, in imitation of the tapestries and figured velvets, was invented and patented May 1, 1634, by Jerome Lanyer, and carried on in London. King William III's drawing-room at Kensington palace was hung with it. But the *Journal Economique* states that a François carried on this art at Rouen in 1620 and 1630, and affirms the wood blocks are still preserved there with the dates on them. The *metal* papers are an imitation of the gilt leather hangings. The *coloured* papers, a cheap substitute for painted decorations, appear to have arisen about 1723. They were originally prepared by the process called "stencilling". *Papiers de teinture* seem to have been brought about the middle of the sixteenth century from China and Japan, by the Dutch and Spaniards, and so late as 1760 to have been almost unknown in France (CRACE). A "painted paper" was used 1749 in a closet or small room in Northumberland House, Strand, as noted in *Elegant Extracts*, 8vo., Lond., 1794, Epistles, 550. In 1754 Jackson had a manufactory at Battersea; and in 1786, G. and F. Echardt made at Chelsea a superior description of work; as also by Sheringham in Great Marlborough Street. GREEN, p. 85.

Subject papers are still made in some of the factories. "The salle à manger at Amiens (1816) was ornamented with a paper, which seems very common at inns, representing the principal buildings at Paris—although the room is about 40 ft. long, there is no repetition of the pattern.—I was once told by a paper-hanger in London that he had seen papers in England which were executed by means of 150 blocks—but on going to Paris he had there seen some which required 2,500 blocks. Another room had the representation of a chase—and a third was adorned with the history of Cupid and Psyche—the execution was not so good as in a painting, but all the parts were expressed with a considerable degree of truth and accuracy, the groups were well disposed, and the light well managed:" the bedroom at Calais had a broad striped paper (p. 1): WOODS, *Letters of an Architect*, 4to., Lond., 1828, i, 14. A few years ago (before 1840) J. C. Loudon suggested an instructive "natural history" paper for cottages, nurseries, and school-rooms; and another article on the subject of "Intellectual paper-hangings" appeared in the PENNY MAGAZINE, No. 504, ix, 1840, p. 52.

Patterns for paper-hangings vary in every degree of taste. Delarue's patent paper-hangings, by being embossed in horizontal lines, form, by embossing alone, a pattern similar to that produced by printing.

The ornamental crystallization on tinned surfaces was in 1818 confined to the japanner's trade. M. J. Brunel patented at that time *metallic paper*, which could be made 4 ft. by 20 ins. It

was reported on, 10 Feb. 1819, most favourably by the Comité des Arts Chimiques of the French Society for the Encouragement of Arts in Paris. Specimens are given in ACKERMANN, *Repository of Arts*, 1819, vii, 269. GOLD PAPER. GLASS PAPER.

G. H. MORTON, *History of Paper Hangings*, read before the Liverpool Arch. and Archæol. Society, Feb. 1875, and published 8vo., Liverpool, 1875. He states that few *Encyclopædias* mention the subject, and that an important account is that by CRACE, *History and Manufacture of P. H.*, read at the Inst. of Brit. Archts., 4 and 18 Feb. 1839; and printed in CIVIL ENGINEER, ETC. *Journal*, 1839, ii, 99; 140: which appears to have been referred to by COWTAN, *On P. H.*, read before the Decorative Art Society, 9 Oct. 1844, BUILDER *Journal*, ii, 526, and CIVIL ENGINEER, ETC. *Journal*, vii, 386. *Jurors' Reports*, Exhibition of the Industry of All Nations, 1851. *Parisian paper stainers*, in BUILDER *Journal*, 1875, xxxiii, 969; and *Wall papers*, 1863, xxi, 685; 718: xxii, 366; and 1876, xxxiv, 903. ARROWSMITH, *Paperhanger and Upholsterer's Guide*, 12mo., 1851.

Washable Paper hangings are worked with Japan gold-size and turpentine, instead of distemper. Crease's Washable paper hangings date in 1828. Morton, Rule, and Co.'s new patent lavable paper hangings, in 1863. Lee and Co.'s patent "Oleo Charta", 1869, a washable paper hanging, impervious to wet, may be put on damp, new, or old walls, and are said to last twenty years. The Amaranth paper staining company limited produced one 1871; BUILDER *Journal*, xxix, 164.

English paper-hangings are cut to 21 ins. wide and are 12 yards long, they are presumed to cover 63 sup. feet. French paper-hangings vary in length and breadth according to quality, but are generally about 18½ ins. wide and 9 to 9½ yards long, and cover about 40 sup. feet. *Tables* are printed by some manufacturers showing the quantity of English paper required for rooms, but they are generally in excess, except perhaps for the commonest papers, which have much waste. The practice is to measure the actual wall space, multiply it by the various heights, divide the quantity by 60, and the result will be the number of pieces: or by 40 for French papers. In some cases 1 in 6 pieces may be allowed for waste or for large patterns. Another rule given is;—Let the dimensions be taken in feet, and squared; divide the sum by 5·3, the quotient will be the number of yards required; or if 1 be subtracted from every 20 contained in the sum, and divided by 5, the result will be exact enough for common practice. Again—The quantity of ordinary room paper required for 1 square yard would be 5¼ ft. long, the width of the paper being 21 ins.; 11$\frac{1}{9}$ sq. yards equal 1 square or 100 ft.; and for 1 square, 19$\frac{8}{21}$ yards of paper will be required. One dozen of paper 21 ins. will cover 7$\frac{1}{3}$ sq. yards: or 1 dozen and 7 yards will nearly cover 1 square: GRANDY, *Timber Importer's, etc., Guide*, 8vo., Lond., 1865, p. 147, who gives a *Table* of net cost of material and labour per square of paper from 10d. to 15s. per piece.

PAPER MILL. A factory in which paper is made, the machinery worked either by water or steam power. 13 Henry VII (1497-98), "May 25, Item for a rew^{d}. yeven at the Paup Mylne, 16s. 8d."; Add. MS. 7,099. p. 47, in S. BENTLEY, *Excerpta Historica*, 8vo., Lond., 1831, p. 117: an entry which appears to contradict the repeated statement that Sir John Spilman erected the first paper mill, temp. Elizabeth, at Dartford, who is buried in the church there.

A mill entirely erected 1862 near London, capable of producing 35 tons of printing or writing paper per week, consisted of two receiving houses with crane, rag picking, and sorting room, esparto preparing room, boiling house with six revolving rag boilers, bleach house with twenty-eight cast-iron and rag-beating engines, size room, draining house, store warehouse of two floors, machine room 118 ft. long, fitted with an 80-inch paper-making machine, and sets of glazing rolls driven by an 8-horse power beam-engine, a second machine house complete, a salle and finishing room, laboratory, steam boiler house with four boilers, each 6 ft. 6 in. diam. and 28 ft. long, and four elephant boilers, lofty stalk, gas retort house, a steam engine house with two pairs of double cylinder beam engines each of 45-horse power nominal, and water-tank forming the roof, holding 32,000 gallons, a second steam engine house with a 30-horse power engine and boiler, offices and workshops, sheds, manager's and foreman's houses, six workmen's cottages; and two wells, each 250 ft. in depth, for washing, besides a river supply. The mill buildings occupy about three acres, the whole site being about five acres in extent.

Jurors' Reports, Exhibition of the Industry of All Nations, 1851. HOFMANN, *Paper Manufacture*, 8vo., Lond., 1873. R. HERRING, *Paper and Papermaking, Ancient and Modern*, with plates and specimens, 8vo., Lond., 1856; 1859, 2nd edit. W. ARNOTT, *Manufacture of Paper*, the first Cantor lecture 1877 at the Society of Arts, etc. MUNSELL, *Chron. of Paper and paper making*, 8vo., 1857.

Louis Roberts invented 1799 a machine for producing sheets of paper of indefinite length; produced by him in England in 1803. A sheet of paper 4 miles long is recorded in BUILDER *Journal*, 1860, xviii, 385. Exhibitions of 1862 at London; of 1867 at Paris; and of Vienna 1873.

PAPER-WORKE. A term used in HOLINSHED, *Chronicles*, fol., Lond., 1586, i, 195, where, describing the buildings of the time of king Henry VIII of England, he states: "Albeit that in these daies there be many goodlie houses erected—yet they are rather curious to the eie like paper worke, than substantiall for continuance—"; and, p. 234, "building with stone so commonlie taken up, that amongst noblemen and gentlemen, the timber frames are supposed to be not much better than paper worke, of little continuance, and least continuance of all".

PAPIBERGA, see BAMBERG, in Bavaria.

PAPIER-MACHÉ, or mashed paper. The French term adopted in England for a preparation of moistened paper, of which many articles are made. CARTONPIERRE, or stone made of card, is used for heavier portions of such work. The former was carried on in Paris by Lefevre before 1740. The process of making papier mâché is described in DOSSIE, *Handmaid to the Arts*, 8vo., London, 1764, ii, 397. Dr. JOHNSON saw a factory of it 1774 at Birmingham. WARE, *Body of Arch.*, fol., Lond., 1767, p. 458, says, "The old deception of stampt paper, instead of carved wood, is coming up with all the rage of fashion, etc."

For architectural work, *papier mâché* is prepared by laying sheets of brown paper one over the other, a coat of glue being given between each. These sheets of paper thus glued together are then pressed into a metal mould of the ornament required; the *papier* thus stamped to shape is afterwards trimmed; a composition of the pulp of paper mixed with rosin and glue is now put in the mould before used; the *papier mâché* ornament previously stamped is again inserted, and is again pressed upon the pulp composition, which thus adheres to it, and produces a sharp, well-defined ornament. In some works it is stated that "two methods of making it are adopted;—the first, by glueing or pasting different thicknesses of paper together; the second, by mixing the substance of the paper into a pulp and pressing it into moulds. Trays and flat articles are made by the first process, painted and varnished. The second process more nearly concerns the architect. The pulp is generally made of cuttings of coarse paper boiled in water and beaten in a mortar till they assume the consistency of a paste, which is boiled in a solution of gum or size. The moulds are made of brass in the usual way, and a counter mould also, to make the cast nothing more than a crust or shell. Light strips of wood are glued to the back of large articles, keeping the work in its place, and being available for fixing, for which only nails and screws are required"; ARCHITECT *Journal*, 1870, p. 15. Improvements in the preparation or treatment of carton pierre, papier mâché, etc., were patented Feb. 6, 1858, by White and Parlby, which consisted in producing direct from moulds, forms of such materials in colours. This

process is stated from the specification in BUILDER *Journal*, 1858, xvi, 766. BIELEFELD, *Gothic Ornaments*, 4to., 1835; *Ornaments*, 4to., with a view of the Pantheon (1835); and *Ornaments in every style*, 4to., 1836; also *On the Use of the Improved P. M. in furniture, and in the interior decoration of Buildings, and in works of Art*, 4to., Lond., (1840 ?), and *Historical Account of the application of P. M.*, with an interior view of the Pantheon Bazaar, prefixed to his *Papier Mâché Ornaments*, 4to., Lond., 1840, reprinted in CIVIL ENGINEER, ETC. *Journal*, 1840, iii, 201-2. In 1847, 14 Jan., he enrolled a patent for *Improvements in the making of moulds or dies*, etc., as described in the same work, 1847, x, 119. BIELEFELD, *Portable Buildings of Papier Mâché*, plates.

Maps in relief, also made of papier mâché, were apparently the invention of C. F. Bielefeld in 1840; CIVIL ENGINEER, ETC. *Journal*, 1840, vii, 286. Desachy's patent Fibrous plaster is an invention akin to this material, being made of plaster covered inside with a coarse canvas; it is very light and lasting. CANNABIC COMPOSITION. PASTE BOARD. 14.

A church built entirely of a sort of papier mâché, and capable of holding nearly a thousand persons, was erected at Hoop, near Bergen, in Norway; it is octagonal without, but perfectly circular within: both sides are covered with this material, which was made waterproof and nearly fireproof by an application of vitriol water, and lime slaked with whey and white of egg. ERSCH and GRUBER, *Allg. Encycl.*, 4to., Leipzig, 1838; referring to Corn. de Jong's journey from Drontheim, in FISCHER, *Reise bibliotheq*, i. A papier mâché village consisting of nine houses, and a villa with nine rooms 12 ft. high, a store house 80 ft. long with four dwelling rooms, and houses of different sizes consisting of from two to six rooms, were made by Bielefeld for — Seymour, a gentleman about to reside in Australia. They are depicted in the ILLUSTRATED LONDON NEWS, Aug. 16, 1853, xxiii, 80.

PAPIN (JEAN), was *maître des œuvres* at the cathedral of Tours, as stated in his epitaph in the parish church of S. Pierre-des-Corps in that city; he died 24th December 1480. He succeeded Jean Dampmartin; and it is to these two architects that the erection of the last bays of the nave is attributed. In an account of 1462 is the following: "Item to Jehan Papin and Jehan Gaudin, maistres des œuvres, pour leur vin d'estre allez pour ladicte ville (de Tours), veoir comme ou recepteroit le portal d'emprès l'arche S. Ciquault, à Vençay, à S. Sauveur, et en autres endroitz des murailles et tours de ladicte ville qu'il falloit réparer, et à plusieurs fois ont eu xxviiis. iiiid. t..." In 1478 Papin presided at the survey for a plan of the town of Tours. GRANDMAISON, *Documents Inédits*, Paris, 1860.

PAPISRANG. A wood of Penang, of a pale brown colour, from 6 to 9 ft. in circumference, and 40 ft. long; not good for beams, but chiefly used for furniture. A purple wood of the same name is strong and used for beams. 71.

PAPO (JEAN), architecte du roi, designed and carried out the citadel at Nismes, of which the first stone was laid 15 May 1687, and with great despatch was nearly completed in one year; under the Restoration it became the *maison centrale de détention*. FROSSARD, *Nismes*, 8vo., N., 1834-5, ii, 130: and *Tableau*, 8vo., N., 1846, p. 84.

PAPPACODA (ARTUSIO), "Miles Artusius Almam de Pappacudis", as in an inscription, a favourite of king Ladislaus, built after his design the church of S. Giovanni Evangelista a Carbonara, or S. G. E. de' Pappacoda, near that of S. Giovanni Maggiore, at Naples, which was completed 1415, and to which A. Bamboccio added the façade and elaborate Gothic doorway. DOMENICI, *Vite*, 4to., Naples, 1742-65, i, 146; 1840, i, 280.

PAPPENHEIM STONE. The mosques at Constantinople are paved with blocks of calcareous stone obtained from the quarries at Solenhofen, one mile from Pappenheim, in Bavaria, from whence are extracted slabs, etc., which take a fine polish, the grain being of extreme fineness, and the colour uniform and of a whitish yellow. These quarries are well known for furnishing the finest stones for lithography. BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 27. 50.

PAPWORTH (JOHN, and JOHN BUONAROTTI from 1815), born in S. Marylebone, 24 January 1775, was the second son of John Papworth, an eminent stuccoist, etc., at the end of the last century. The son learnt drawing, ornament, perspective, and figure in his father's house, had some instruction in architecture from Sir W. Chambers, entered the office of John Plaw, was apprenticed 4 Nov. 1789 to Thomas Wapshott, builder, for construction, measuring, etc., and was with — Sheringham, of Great Marlborough Street, to obtain a knowledge of painting and decorating. By this education he acquired a most intimate practical knowledge, so that during life there was scarcely any branch connected with building in which he was not both ready and willing to show the master or artisan how best he could improve his work. It also soon caused him to be sought out by others who had made more position in life than himself, and who were glad to avail themselves of his assistance in carrying out works of novelty or difficulty, whilst he was but partially known as their author. Commencing his career as a follower of the Italian school of architecture, he succeeded beyond any of his contemporaries so far as classic design and its careful delineation could effect; leading the school of the Greco-Roman professors: even his best works, however, were mainly shown in modernising and embellishing the existing edifices belonging to numerous members of the nobility and gentry. J. T.

He was a man of highly honourable and deeply sensitive character; devoted to his art; a very effective draughtsman; and respected by his professional brethren. T. L. D.

He designed 1793-4 Ray Lodge, Woodford, for George, son of Sir James Wright, bart., residing with that family while superintending its erection: and in each year 1794-9 he sent a design, chiefly in perspective and to a large scale, to the Royal Academy exhibition; and became, Dec. 1798, a student, in which year he sent a bust modelled by himself of his elder brother. For Richard, second earl of Lucan, he designed and superintended 1803-6 the mansion, with stabling, cottages, etc., at Laleham, Middlesex, to which in 1827-30 he made various additions; and 1832-5, a stone verandah, conservatory, etc.; with large alterations in 1839, the model farm, stabling, etc., for George Charles, third earl; also buildings on the estate at Castlebar in Ireland. From 1805-8 he carried out large additions to the residence at Wandsworth for George Tritton, esq., banker; 1815-17, at Fyfield, Essex, for George Dorrien, esq., governor of the bank of England; 1817-19 a large residence at Haresfoot, Essex, for Thomas Dorrien, esq.; and 1820 the house, etc., called St. Julien's, near Sevenoaks, Kent, for Robert Herries, esq., banker. In 1820-22 he designed the residence at Leigham Court, Streatham, for John G. Fuller, esq.; and in 1823-44 added to it the second and larger house very carefully detailed, farm yard, etc. In 1807 he designed the rectory house at Woolwich, for rev. W. Fraser: 1810 the residence at Chigwell Row, for Sir David Wedderburne, bart.; 1816 large additions at Gwynne house, Woodford Bridge, for Henry Burmester, esq.; and assisted John W. Hiort, private architect to prince Leopold and the princess Charlotte of Wales, in many designs at their residence, Claremont, including the conservatories, entrance gates, stabling, etc., and the Gothic summer seat, which eventually was remodelled as a cenotaph in memory of that princess after her death in Nov. 1817.

For James Morrison, esq., of the well-known firm of Fore street, City of London, he 1821-3 redecorated his residence at Balham hill; modernised 1829-42 his mansion at Fonthill, Wiltshire, adding lodges, entrance gateway, etc.; in 1831-3 designed the decorations, etc., to his town residence, No. 57 Harley street, including ornate library fittings; and 1839-44 designed the restoration and completion of Basildon park, Berkshire, including the entire finishings with ornamental ceilings to several large rooms, the cottages, lodges, entrance gates, park farmstead, etc. For the firm of Morrison, Dillon, and Co., he in 1824-35 de-

signed the Milton Street Warehouse, another in Fore street, designed the new fittings and fixtures; and carried out the later alterations and additions, with the new front next Fore street.

On the occurrence of the destruction by fire in 1823 of a house in Fleet street, he designed and carried out the houses forming "St. Bride's Avenue" opening up St. Bride's steeple, the work of Sir C. Wren, which had been shut out from view. A view of it was engraved on copper, and a woodcut appeared in the LITERARY GAZETTE *Journal*. For Rudolph Ackermann, he designed 1826 the extensive premises No. 97 Strand, having already in 1812 carried out the room 56 ft. by 20 ft., the tea room, etc., at No. 101, Strand, as a place of réunion for the nobility, gentry, and artists to lounge and inspect the recent works of art which that eminent publisher was producing (it is given in *Repository of Arts*, etc., ix, 230). During 1824-32 at Cheltenham, he designed and superintended the residences for Dr. Shoolbred; for Richard Roy, esq.; for — Scott, esq.; and for capt. Capel; completed Suffolk or S. James's church (Gothic), begun by — Jenkins, with 1400 sittings; designed the rotunda, or new pump room at Montpelier Spa, with its furniture, reading room, conservatory, etc., for Pearson Thompson, esq.—("this rotunda 52 ft. diam., and 54 ft. high, with a coffered dome, is of its kind perfectly unique"; *Cheltenham Guide*, 1861): laid out the Montpellier estate; designed several of the terraces, and one for Robert Morris, esq.; with Nos. 15-17 Lansdowne place; and designed and superintended S. John's or Berkeley street chapel (Greco-Roman) and cemetery, for rev. W. S. Phillips, having between 800-1000 sittings. During 1825-32 for John Blades, esq., of Ludgate hill, he laid out the Brockwell estate at Dulwich, designed and superintended Brockwell hall, Clarence Lodge, with two houses in Brockwell terrace, etc., when the speculation was brought to a close. In 1825 large alterations were made to Brampton park, Huntingdonshire, for lady Olivia B. Sparrow: 1828-32 he designed a new wing, etc., at Prickler's Hill, near Finchley, for Thomas Wyatt, esq.: 1828-46 extensive alterations, with farm buildings, etc., at Little Grove, East Barnet, for Fredk. Cass, esq.; the picture gallery (designed by him after the model of that of Benj. West, P.R.A.), saloon, etc., for John Allnutt, esq., at Clapham Common: extensive alterations for Charles Nevill, esq., at his residence Holt, in Norfolk: the finishings to the residence, 1830-40, including conservatories, lodge and garden buildings, billiard-room, etc., for William Leaf, esq., at Park hill, Streatham: 1835 modernising, with iron verandahs, etc., No. 2 Seamour place, Park lane, for lord Ducie; 1835 designed the house and farm buildings at Ornhams, near Boro'bridge, Yorkshire, for George Crow, esq.: 1838 some additions and garden work at Church lane, Kensington, for the princess Sophia of Gloucester: and 1844-6 designed the house in King's road, Clapham park, for J. E. B. Stevenson, esq.

For Alexander Murray of Broughton, esq., 1833-37, he modernised the mansion at Cally, Kirkcudbrightshire, including raising and forming new and richly ornamented ceilings to the principal rooms, with the dressings; a projecting entrance hall, the marble lining, etc., of which was executed in Italy; a portico of four monolithic granite columns; new wings, corridors, etc., all in granite: and in 1837-9 restored for him Orleans House, Twickenham.

Amongst others of his executed works of varied character may be mentioned the "severed column" (the first of its sort) erected 1816 on the field of battle of Waterloo, to the memory of col. Gordon: the reparation in 1829 of S. Paul's church, Clapham Common, including new foundations and screwing up its lateral walls to the upright: 1830-34 securing the overweighted stories by a mechanical truss partition, for messrs. Howell and James of Waterloo place: whilst among his few unexecuted designs are comprised the laying out of the proposed estate "Hygeia", opposite Cincinnati, on the river Ohio, for William Bullock, esq. (the former owner of the Egyptian hall, Piccadilly), accompanied with designs for plans of houses and various buildings (the estate is described in BULLOCK, *Sketch of a Journey*, etc., 8vo., Lond., 1827); 1825-30 planning and surveying the properties for forming a proposed "London Central street" in continuation northwards of Fleet market; and the proposed "Greshambury new street" from Cheapside into Queen street, schemes not at that time very generally undertaken; and both in some respects now accomplished; and 1817-20 the three designs made on various scales of accommodation, for a palace at Cannstadt for Wilhelm king of Wurtemberg; with lodges, etc.; and a design, partly carried out, for laying out the park in the English fashion; in Nov. 1820 he received the diploma of architect to the king, dated 26 August.

Among his other improvements upon the then dry and monotonous form of street architecture, may be mentioned shop fronts and façades;—1814, for Messrs. Duppa, the low house now No. 314[a] Oxford Street; 1817-9 No. 88 New Bond street, for George Morant, decorator; 1822-3 the decorated façade to Messrs. Sparrow's Tea warehouse, Ludgate Hill; 1822-7 No. 17 Coventry street, Haymarket, for Messrs. Clarkson and Turner; 1829 for — Dutton, No. 57 Great Coram street: No. 94 Holborn Hill, for Messrs. Thompson and Fearon and Co.; as well as those of 97 Strand; St. Bride's avenue; Messrs. Morrison and Co., Fore street; etc.

Mr. Papworth's attainments as a landscape gardener obtained him employment by many clients previously mentioned; as also by the late earl of Shrewsbury, at Alton Abbey, now Alton Towers, where 1818-22 he designed the bridge of seven arches, the conservatory, the Grecian and Gothic temples, garden seats, the foundations for the pagoda, etc.; 1820-29 at North End, Hammersmith, for Wm. Jones, esq.; 1823 the grounds at Kew priory, for Miss Doughty; 1824 for — Willan, esq., at Brentwood; at Rickmansworth, Hertfordshire, for Thos. Fellows, esq.; 1825 at Clapton for William Amory, esq.; 1826 at Holly Lodge, Highgate, with a conservatory and a new room, for Mrs. Coutts, afterwards duchess of St. Alban's; at Harefield, for — Flower, esq.; at South Lambeth, for William Heseltine, esq.; 1828 at Blackheath for R. Paterson, esq.; 1829 at Twickenham, with conservatory, aviary, etc., for Thomas Todd, esq.; 1832 at Dulwich, for James Hannen, esq.; 1833, at Kirby Hall, Yorkshire, with conservatory, for R. H. Thompson, esq.; 1835-9, at Clapham Common, with conservatory, for J. T. Betts, esq.; 1842, at Beddington rectory, for rev. James Hamilton; etc.

He published *Essay on the Causes of the Dry Rot in Buildings*, 4to., Lond., 1803, the first printed on the subject then becoming "universally lamented"; his precepts and a "metallic wash" were applied on numerous occasions with success. He was long a contributor to Ackermann's *Repository of Arts*, etc., a monthly review, published 1809-28; in it appeared *Select Views in London*, with 76 coloured plates, reprinted with his name in 1816; 1812 "a Verandah"; 1813-4 a series of papers, with coloured designs, entitled *Architectural Hints;* 1816-18 a new series of *Architectural Hints*, which were republished as *Rural Residences, a Series of villas, etc.*, 8vo., 1818; 1819-22 a series of designs on *Ornamental Gardening*, which, with the same title, was reprinted 8vo., 1823, both works having a large sale and effecting much influence on the public taste. In 1818-9 he assisted W. H. PYNE in the descriptions of Marlborough House, St. James's and Kensington palaces, for the *Royal Residences*, published 1820, 4to. In 1823 he wrote for W. H. PYNE'S *Somerset House Gazette* the articles *Antony Pasquin* and *Somerset House* (reprinted by GWILT, in his edition of the work by Sir W. Chambers, 1825), *The Adelphi*, etc.; 1823-5 six descriptions of buildings for BRITTON and PUGIN, "*Public Edifices of London*"; edited the fourth edition of Sir Wm. Chambers's "Decorative Part of Civil Architecture", adding copious notes, and *An Essay on the Principles of Design in Architecture, with nine plates, illustrative of Grecian Architecture*, fol., Lond., 1826; read 1835 *On the Benefits resulting to the Manufactures of a country from a well-directed cultivation of architecture, and of the art of Ornamental Design*, at the Inst. of Brit. Archts., and

printed in *Transactions*, i; 1841 *Suggestion referring to the stone beam at Lincoln Cathedral*, and printed in *Transactions*, ii; and also *Explanation of the method adopted by him in* 1829, *to confine the lateral walls, then inclining outwards, of Trinity Church, on Clapham Common*", printed in "THE SURVEYOR, ETC., *Journal*", iv, 187.

His talents were in request from an early period for artistic designs for manufactures, decorations, furniture very largely for his clients and tradespeople, silver, gold, and other metal work, as well as for testimonials, such as the centre piece presented 1812 to Sir W. Adams, the celebrated oculist; the salver presented 1816 to serjeant Onslow, M.P., for parliamentary services; glass, as for chandeliers, girandoles, the chair for the shah of Persia, etc., for John Blades; transparencies, etc.; the decoration of "the London Engineer Steam packet", 1818, the first one plying below bridge on the river Thames (*Repository of Arts*, viii, 64, ser. 2); emblematical designs for the covers of the "Forget-me-not" annual from 1825 to 1830; three decorated blinds 1827 for the Phœnix Bank at New York, in the Greek style as erected: and 1835 the design with complete decorations, including all the materials, for drawing and dining rooms at Philadelphia, United States, for W. H. Robertson, esq. Having this reputation, he was solicited to be a witness at Mr. Ewart's committee 1835 on "Arts and Manufactures"; and the following year was selected by Lord Melbourne, prime minister, at the instance of Lord Sydenham, to form and establish the "Government school of design" to be located in the former rooms of the royal academy of arts at Somerset House; of which the details of arrangement, the fittings, selection of masters, books, casts, etc., were left to him as director, assisted by his son John, as secretary, which offices they held for about fifteen months, when a more economical arrangement seemed necessary to the council, and the proposed grant from Parliament being reduced from £1,500 to £1,300, necessitated their retirement, and that of one of the masters.

Early attached to art in its widest sense, Mr. Papworth acted as honorary secretary to the "Associated Artists (subsequently Painters) in Water Colours", for its first exhibitions, sending 1808 a fine work, "The Hall of Hela", exhibited the previous year at the Royal Academy, which was bought by a nobleman of great celebrity and connection; with other drawings of a size and power beyond the usual works at that period. His early (1794-9) drawings exhibited at the Royal Academy of Arts prove his intimate acquaintance with the laws of perspective; 1815 he sent "an altar-piece in the private chapel at the seat of a nobleman, intended to combine in its structure architecture, painting, and sculpture". The drawings of the four façades of the Wurtemberg palace, exhibited 1823 and 1827, were pointed out to the students of the academy for their merits by Sir John Soane, then professor. His facility for drawing figure subjects, equally with architecture and ornament, is exemplified in the very numerous sketches and drawings in the possession of the family. He was one of the original members of the Graphic Society, founded 1833; and a member of the Society of Arts, etc., from 1805 to 1833. He was consulted at the preliminary meetings on the formation of the Institute of British Architects, and was one of the twelve who signed the resolutions passed 2 July 1834, for bringing it before the public; was elected vice-president for 1835-6-7; ordinary member of council 1840-1; vice-president 1841-2; and again 1844-45-46: he retired in Dec. 1846, and was thereon elected an honorary member.

Failing health at the end of 1846 decided him on retiring from the profession, on which occasion fifty of his professional brethren of eminence, including C. R. Cockerell, R.A., professor Donaldson, with his pupils, united to present him with a silver inkstand as a memento of their esteem and respect. Mr. Papworth left London 6 Feb. 1847 and resided at Little Paxton, near St. Neot's, Hunts, where, in a house designed by him (1806) for his aunt Mary Papworth, he died 16th June of the same year, aged 72 years, and was buried in the churchyard, near some of the members of his father's family. He left two sons, JOHN WOODY (as under), and Wyatt, the conductor of this work. A portrait, painted by James Green, was engraved 1814 in mezzotint by William Say; and another of a somewhat later date was painted by James Ward, R.A., one of only three portraits painted by him till within a few years of his death. His pupils were his brother George; Sam. Benwell, died after 1819; James Thomson, F.I.B.A.; W. A. Nicholson, of Lincoln, F.I.B.A., died 1864; J. D. Hopkins, F.I.B.A., died 1869, and his two sons. No other memoir of him has yet appeared. W. P.

PAPWORTH (JOHN WOODY), eldest son of the above John Buonarotti, born 4 March 1820, in Bath Place, New Road, was instructed in his father's office, became a student 1839 of the Royal academy of arts, and exhibited there from 1837 to 1851 subjects of architectural design and ornament. About 1835 he entered into professional pursuits under his father, with whom he remained until the retirement of the latter at the end of 1846; in 1857 became secretary to the council of the Government school of design on its formation, and retired at the same time with his father, who held the post of director of the schools. In 1838 he received the silver Isis medal of the Society for the encouragement of arts, etc.; 1840 the gold Isis medal; and 1845, the "Stock medallion": in 1842 the Soane medallion; 1843 the medal of merit; and 1847 the silver medal, all three from the Institute of British Architects, for various designs and essays, the "Soane" being for a restoration of Crosby Hall. Besides many articles in the BUILDER *Journal*, not all signed, he wrote *Artistic Ecclesiastical Decoration*, for Weale's "Quarterly Papers", 1844: *Considerations upon some of the Productions connected with Architecture in the Exhibition of* 1851; and another on the "Exposition des Produits d'Industrie" of 1855 at Paris; an abridgement of M. Lance's Essay *On a Diploma in Architecture;* in 1854 he explained a new theory *on the Construction of Domes*, subsequently adopted by J. Fergusson in his "Illustrated Handbook of Architecture": 1857 *Beauty in Architecture, and its Alliance with the Past;* 1862 *An Æsthetic Principle in Decoration;* 1866 *On the Roofs of Hypæthral Temples at Ægina and Bassæ;* all printed in the *Sessional Papers* of the Institute of British Architects, in the proceedings of which society he ever took deep interest. With his brother, he brought out *Specimens of Decoration in the Italian Style*, 4to., Lond., 1844; and *Museums, Libraries, and Picture Galleries*, 8vo., Lond., 1853, the plates in both works being engraved by them: and lastly compiled and printed by subscription, *Ordinary of British Armorials*, 8vo., Lond., 1847-72, a work which, though not architectural, has proved most useful in elucidating the heraldry of buildings. His connection with the early years of the Architectural Publication Society led to his taking great interest in this *Dictionary of Architecture* from its commencement.

His more important works in architecture, beyond those in which he assisted his father, are the tomb to Thomas Hardy in Bunhill Fields cemetery; the Albert Institution, Gravel Lane, etc.: and besides other prizes in competition, he gained 1859 the second one in that for additions to the guildhall, courts of justice, assembly rooms, etc., at Cambridge. He made designs, under instructions, for railway improvements and cattle market schemes; and many for glass, terra cotta, pottery, paper hangings, and other art manufactures, as well as for the Exhibition of the Industry of All Nations 1851, including that of the carpet worked by 150 ladies. Overwork and inattention to health brought on an attack of gangrene in his right foot, which after a confinement to the house for about six years, resulted in his death 6 July 1870, in the 51st year of his age: he was buried in the new ground of Highgate cemetery. Memoirs in BUILDER, and ARCHITECT, *Journals* of July 1870.

PAPWORTH (GEORGE), third son of JOHN, sen., was born in London 9 May 1781; became at an early age a pupil of his elder brother John, and acted as his clerk of the works at several buildings until 1804, when he went to Northampton to take the

direction of Mr. Kershaw's office. Leaving there May 1806, he went to Dublin to superintend the affairs of the company then working the patent of Sir George Wright, bart., for the manufacture of stone tubes for pipes, and for cutting circular work. He obtained the patronage of lords Westmeath and Gormanstown; and the company not prospering, he turned his attention to mechanics, and produced a sewing machine, and a pump, which latter met with general encouragement, and a valuable connection in Mr. Slater of Birmingham. In 1818-20 he designed additions, etc., at the Dublin library society, D'Olier street, costing £5,600; 1822 the court house at Castlebar, co. Mayo (largely added to 1860 by — Wilkinson of Dublin); 1824-26 Portumna castle, co. Galway, for marquis of Clanricarde; Oct. 1823-7 King's bridge, over the river Liffey, at Phœnix park, of cast iron, having one arch 100 ft. span, and 30 ft. 9 ins. wide between the parapets, with granite abutments; careful arrangements were taken with success against expansion, etc.; it was cast by R. Robinson of Dublin, and cost £19,000. In consideration of its merit he was elected 1831 a member of the Royal Hibernian Academy. He designed additions to the Marlborough Street R. C. Chapel, and designed the Whitefriars' or Carmelite friary R. C. chapel, in Dublin, 200 ft. long, 36 ft. wide; 1836 Kilcornan house, co. Galway, for Sir T. N. Redington; 1842 Brennanstown house, co. Dublin, for Jos. Pim, esq.; 1842 Seafield, co. Sligo, for J. Phibbs, esq.; and 1849-51 the Kilkenny lunatic asylum for 150 patients, for the commissioners of public works, at a cost of £21,500 for the building. In this year he was chosen treasurer to the academy; and completed the works designed by his son John Thomas just before his decease, at the museum of the Royal Dublin Society, Kildare street: he also designed the museum of Irish Industry, Stephen's Green; and 1852 the Freemason's orphan school, Grand canal: one of his later works was an extensive warehouse for the British and Irish Steam packet company, built on the marsh by the side of the river Liffey, below the custom house. This building sank bodily 18 ins. without requiring any subsequent repair or attention, beyond screwing up some iron work for which preparation had been made. From 1837 to 1842 he acted as architect for the province of Connaught to the ecclesiastical commissioners; held the appointment of architect to the Dublin and Drogheda Railway, and of the royal bank in Foster place. His latest important edifice was Kenure house, now called Rush park, Rush, co. Dublin, of which a plan and view, with details of the roof over the staircase, are given with a *memoir* in the Builder *Journal*, 1855, xiii, 150-1. The bridge, and one of the two chapels, are given in Wright, *Ireland Illustrated*, 4to., Lond., 1829; p. 28, 36.

He died in Dublin, from the effects of a severe cold, March 14, 1855, aged nearly 74 years. "He was the first to introduce into Dublin and Ireland exterior decoration in architectural design, combined with a light and elegant appearance, particularly in private dwellings; in fact, he was the father of a new school; in which Turner, a builder of Dublin, took pattern from him in various places, and other persons copied his ideas. His cast-iron bridge across the river Liffey was at the time he designed it a novelty in bridge building; it is beautiful in design and light in appearance; and is a fine monument to his memory;" (communication from W. Hughes, C.E.)

His eldest son John Thomas, born in Dublin, 17th Dec. 1809, was educated in his father's office, and assisted him till nearly his own death. Among his own designs were the monument to Curran in Glasnevin cemetery; extensive alterations to Leinster house, Kildare Street (erected 1745 by R. Cassels), to adapt it for a museum of Irish Industry; including a lecture room 50 ft. by 45 ft., with a central skylight, and well arranged for audience and lecturer: and became honorary secretary to the Institute of Irish architects. His health failing, he travelled, and visited Paris, where he died 6th Oct. 1841. A brother, Collins Edgar, held an appointment in the colonial engineer's office at Melbourne, where he died 1st Nov. 1862, aged 38 years: another brother, Charles William, has succeded to some of his father's offices and practice in Dublin.

PAPYRUS. A species of reed, rush, or water lily, the Cyperus Papyrus, called by the Egyptians *gama*, and by the Greeks *byblos*. The internal skin of it, when dried and prepared, was used by the ancient Babylonians (it being found in the river Euphrates), and by the Egyptians, for writing upon. It was indigenous to the volcanic regions of the north of Palestine; the existence of large areas of floating papyrus north of the lake of Hooleh, near the rise of the river Jordan, is described in Mac Gregor, *Rob Roy on the Jordan*, 8vo., Lond., 1870, ch. xvii, map p. 220; p. 288; 297, and map 6, p. 306. From thence it was probably carried into Egypt, where it was largely cultivated in pools of still water 6 ft. deep, but it is not now to be found in that country: it was used in the XVIII and XVI cents. B.C. One bank of the small lake Ibrahim, near to and south of lake Victoria Nyanza, was found to be covered with the floating papyrus; Long, *Central Africa*, 8vo., Lond., 1876, p. 164. It has also been found indigenous in a small stream near Syracuse in Sicily; and among the hills in Cordovan.

The width of the papyrus prepared sheets was generally 15 ins., but their length sometimes, though rarely, extends to 150 feet. Both before use and afterwards, it was rolled up into cylindrical volumes, and when opened for the purpose of reading it was unrolled from the ends. The rolls were placed in rectangular wooden boxes close to the scribe or reader: (Birch.) In Owen Jones, *Grammar of Ornament*, fol., Lond., 1856, pl. Egypt, 1 and 2, the fig. 2, pl. 1, seems to be a papyrus and not a lotus. The plant is represented in Lepsius, *Denkmaeler*, fol., Berlin, 1849-59, ii, 130; and iii, 250: and the engraving in Bruce, *Travels*, is said to be "very accurate" by Mac Gregor. Sayce, *On the Use of Papyrus—among the Accadians*, Society of Biblical Archæology, *Transactions*, iii, 430, 8vo., Lond., 1872; a notice in i, 343; and Fox Talbot, *On the Ancient Use of Papyrus—in Assyria, etc.*, 8vo., Lond., 1874, iii, 430. Egger, *Papier dans l'Antiquité et les temps modernes*, 1866. 14.

It has been surmised that the terminal ornament, like fingers grouped together, represents the papyrus, or palmette; examples are shown in Stuart, *Athens*, etc., fol., 1830, iv, p. 12 and 13; and p. 54, pl. 2, giving a peculiar capital.

PARA, see Maria de Belem de Gran Para (S.), in Brazil.

PARABOLIC ARCH. An arch having its intrados in the form of a parabola. One is shown in Murphy, *Batalha*, pl. i, fig. 13. The arch of Tâk Kesra, the site of Ctesiphon, is said to be a parabola by Keppel, *Personal Narrative*, 8vo., Lond., 1827, p. 103, and an ellipse by others: it is 85 ft. wide, and 101 ft. high in the middle, as stated by him.

PARABOLIC CURVE. Gauger, *Fires Improved*, etc., 8vo., Lond., 1716, demonstrates the good effect as regards reflection of heat, resulting by the back part of a chimney being made of a parabolic curve, as indicated in the woodcut in *Detached Essay*, Heat, p. 3.

PARABOLIC CURVE for sound reflectors; see Sound Board.

PARADISO (Mateo), constructed 1217-55 a tower on the famous Alcantara bridge over the river Tagus, at Toledo, a pier of which had been carried away 1211 in a flood. Estevan de Garibay, *Obras ineditas*, ix, fol. 512, tit. 6. 66.

PARADISUS (Fr. *parvis;* Lat. *ambulacrum; area; area Dei;* Engl. *paradise* and *parvise*). A court or atrium open to the sky, preceding the basilica, and usually surrounded, or partly so, with colonnades, or planted with trees, and having a fountain in the middle. The "paradise" on the south side of Chichester cathedral is another use of the term in regard of the principal or regular cloister cemetery of a monastery; in this sense it may be used to include the buildings that surround the regular cloister; Ducange, in voc. The cloister garth at Chester is still called the *Sprise* garden, a supposed corruption of *Le*

parvis, a term commouly given in France to the space in front of, or round about, a church. CHAUCER (p. 3) uses the word "peruise" in reference to an open area in front of a public building, as Westminster Hall. The *aitre* (an old term for *les dépendances* of a house, etc.) of the Nôtre Dame at Rouen, was the parvis or paradise; BATISSIER, 556. There is also the "place du Parvis" around Nôtre Dame at Paris. At Laach, *cir.* 1093-1156, is still the ancient parvis before the church with a west cloister, as at S. Ambrogio, at Milan. 10. 17. 19.

"Paradise" was a fanciful name given formerly to an apartment in domestic architecture, as "a little studiyng chaumber", LELAND, *Itin.*, i, 48; 55: HUNT, *Tudor Arch.*, 4to., Lond., 1836, p. 79. PARVISE.

PARADOS. A Greek term for an entrance; but more particularly that grand entrance, which, in Greek theatres, conducted from without into the orchestra and upon the stage. 6.

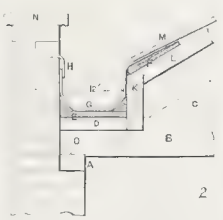
PARAGONE MARBLE, also written "parangon" in some Engl. and Fr. works (Ger. *schwarzer marmor*). A modern marble of a fine black colour, obtained from Bergamo: it is properly the Touchstone basalt. The name has also been given to the antique black, or NERO ANTICO. BERGAMO MARBLE.

PARAGON PAINT. A material submitted to the public in 1849, and stated to be devoid of offensive odour.

PARALLEL COPING. A coping having a level top.

PARALLEL GUTTER. Old definitions describe this as: 1, a gutter between two roofs which are parallel to each other, being made upon the feet of the rafters of two roofs, which meet together: 2, a gutter where a building has a cantilever or modillion cornice projecting some way beyond the walls, the feet of the rafters being rather within the wall, so that the joists of the upper floor lie out beyond the walls, and also beyond the feet of the rafters, which are covered with lead; *Illustrations*, s. v. Gutter: and 3, the gutters to a flat roof, called a platform, for the water from the platform to descend to, and then be carried off by a pipe. 42.

The term is now very often used for a gutter, as in the first instance above stated, where the two sides of it are formed of upright pieces parallel to each other, on which pieces the feet of the rafters may be set, making the gutter wide and deep, so that the ends of the slates are not so easily broken; as in the illustration.



2

PARALLELITH. Pillar stones placed in parallel lines; if these be curved or serpentine, the range is often called *Draconticum*. MAENHIR.

PARALLEL LINES. Lines everywhere equidistant from each other.

PARALLEL OF ARCHITECTURE. In old books, this term was applied to the orders of the Roman or Italian style. Such as FREART DE CHAMBRAY, *Parallèle de l'Architecture Antique avec la Moderne*, fol., Paris, 1650; 2nd edit. 1702. Translated by J. EVELYN, fol., Lond., 1723. The next work of the sort was by NORMAND, *Nouveau Parallèle des Ordres d'Architecture des Grecs, des Romains, et des autres modernes*, fol., Paris, 1819; 1825; 1828. It was translated by A. PUGIN, and two plates added, fol., Lond., 1829: by JACOBI, fol., Potsdam, 1830-36: and MAUCH, *Zu C. N. vergleichender Darstellung der architektonischen Ordnungen*, Supp. fol., Potsdam, 1832-39. A more perfect work is MAUCH, *Neue Systematische Darstellung der Architektonischen Ordnungen der Griechen, Römer, und neuern Baumeister*, 4to., Potsdam, 3rd edit., 1845; 1850; and 6th edit., by L. LOHDE, fol., Berlin, 1872.

One such work on architecture generally is DURAND, *Recueil et Parallèle des Edifices de tout genre, public, ancien et moderne*, fol., Paris, 1800-9; 92 pl., with 8vo. text by Legrand; Brux., 1839-42, 102 pl.; Liège, 1842-5; fol., Venice, 1833-4, with more plates, and 1863, last edition. WIEBEKING, *Analyse descriptive des Monumens de l'Antiquité, des édifices remarquables, etc.*, 4to. and fol., Munich, 1838-40. HIRT, *Die Geschichte der Baukunst bei den Alten*, 3 vols., 4to.; 33 pl., fol., Berlin, 1821-7. CANINA, *L'Architettura Antica des. e dim. coi Monumenti*, etc. (Egypt, Grecian, Roman), 8vo. and fol., Rome, 1830-44; 1839-46. COUSSIN, *Du Génie de l'Architecture*, 4to., Paris, 1822.

The most modern illustrated publication of this description is that of FERGUSSON, *History of Architecture in all Countries*, 8vo., Lond., 1865; and of *Indian and Eastern Architecture*, 8vo., Lond., 1876.

In Mediæval architecture only, there is no special work. SHARPE, *Architectural parallels, or the progress of Ecclesiastical Architecture*, etc., fol., Lond., 1845; with Supp. containing the *Mouldings* full size, fol., Lond., 1848, contains a few abbeys. SHARPE, *Supp. sketch of the Collective History of Chichester cath., Boxgrove priory, and New Shoreham church, as indicated by their mouldings*, 4to., Chichester, 1861. SHARPE, *The Seven periods of English Architecture defined and illustrated*, 8vo., Lond., 1871, 2nd edit.

PARALLEL PERSPECTIVE. A term applied to that division of perspective in which only the lines of the side of any building converge to the vanishing point. ANGULAR PERSPECTIVE.

PARALLEL RULER. This instrument consists of two flat rulers connected together by metal bars, moving easily round the pins which secure their ends; of these there are three sorts, and a fourth which is also flat and made to roll in a direction parallel to itself, by means of two rollers fixed to it. A scale or scales is sometimes fitted to the edge. ROBERTSON, *Mathematical Instruments*, 8vo., Lond., 1775, 3rd edit., p. 10.

PARALLEL TRIAPSAL. A term used by WHEWELL, *Arch. Notes, etc.*, 8vo., Lond., 1842, 3rd edit., 114, to denote a church having the three apses pointed towards the east, as distinguished from the *transverse triapsal* churches, which have the apse at the end of the transepts as well as at the choir.

PARAMENT (Ital. *parato*; Fr. *parrement*). A term used in some books of the eighteenth century, for a uniform course of stones. CHAUCER, fr. 202, used the word apparently for the furniture, ornaments, and hangings of an apartment, especially of a room of state, or one used for the reception of company. HIGH ALTAR. 17.

PARAPENT, PARPENT, and PERPIN; see PARPAIN.

PARAPET (It. *parapetto*; Sp. *parapeto*; Fr. *parapet*; *garde fou*; Ger. *brustwehr*; Hindost. *guldar, kuthera*). A low or breast-high continuous embankment, wall, or fence, serving as a protection on roofs, bridges, terraces, platforms, and such like places, and often finished by a projecting coping. In modern Roman and modern Grecian architecture, it is often decorated. BALUSTRADE. *Illustrations*, s. v. Baluster. A sort of parapet, richly ornamented and painted, an unusual feature in Greek art, existed on the cornice of the temple to Hercules at Agrigentum, as shown in FASO PIETRASANTA (duca di Serradifalco), *Antichità della Sicilia*, fol., Pal., 1834-42, iii, pl. 17.

In mediæval architecture it is often low, terminating the wall of the building above the gutter, and finished by a coping, unless machicolated or crenellated, in which case it projects and overhangs the face of the wall below it. MACHICOLATION. BRETESMONTS. In later times the parapet became ornamented and even pierced; and in Elizabethan architecture it is sometimes seen with letters forming an open work into some motto, date, or inscription. The GLOSSARY states that "in France they are of the greatest rarity—they are usually pierced, not panelled; in early French work they sometimes consist of a series of open arches supported on small shafts, as at the cathedrals of Chartres and Bayeux: in Flamboyant work the piercings and tracery partake of the peculiar character of the style". Many examples

in France are given in VIOLLET-LE-DUC, *Dict.*, s. v. Balustrade. The fine arcaded gutter parapet at Reims cathedral is given in GAILHABAUD, *Arch. du Vme.*, 4to., Paris, 1858, i. "The roof parapets of Venice—differ from those of all other cities of Italy in their purely ornamental character. They are not battlements, properly so called; still less machicolated cornices—; but merely adaptations of the light and crown-like ornaments which crest the walls of the Arabian mosque;" they are further described, with cuts, and a plate, in RUSKIN, *Stones of Venice*, 8vo., Lond., 1851-3, ii, 241-7. Others in Italy are shown in STREET, *Brick, etc., Arch.*, 8vo., Lond., 1855.

If the wall be not continuous but broken at intervals, it usually comes under the designation of a BATTLEMENT: many examples of it are given under that head; and several have been found still remaining in the ruins of ancient buildings in Assyria and Egypt, the battlements being in the form of shields. In Ireland, a peculiar and very picturesque one is common to the ecclesiastical, castellated, and domestic buildings; WILKINSON, *Geology*, 8vo., Lond., 1845, p. 131. A peculiar arcaded parapet, through which the water was conveyed from the roof, is seen at the ecclesiastical buildings at S. DAVID'S, and a few places in connection with that see; it would appear to be an improvement upon the mode adopted in the early buildings in Ireland; WILKINSON, p. 103.

PARAPETASMA. A Greek term for a veil, curtain, awning, lattice work, or solid enclosure, screening the statue in a temple. FALKENER, *Museum, etc.*, 8vo., Lond., 1860, i, 322 note. It was raised in the *naos* and in front of the statue. 25.

PARAPET GUTTER. A gutter to a roof formed next the parapet: a woodcut is given s. v. Gutter.

PARASANG. A measure of distance, which, like its representative the modern *farsang*, or *farsakh*, of Persia, was not very accurately determined, but rather indicated a certain amount of time employed in traversing a given space. In Khorassan and central Persia, where mules and horses are chiefly used by caravans, it is equal to 4 miles; whilst in the mountainous regions of western Persia, where the roads are difficult and precipitous, and in Arabia, where camels are the common beasts of burden, it scarcely amounts to three. The *farsakh* and the hour are almost invariably used as expressing the same distance. The parasang of Xenophon was the same as the modern hour: LAYARD, *Discoveries*, 8vo., Lond., 1853, p. 59. HERODOTUS, ii, 6; v, 53; vi, 42; HESYCHIUS, and SUIDAS, state it was equal to 30 stadia, which would be from about $3\frac{1}{4}$ to nearly 4 English miles, and this agrees with many modern English writers. 13. 14

PARASCENIUM. The Gr. term for the enclosure behind and on each side of the scene, appropriated to the convenience of the actors, when retired from the stage, with magazines for the preservation of the scenic property, and to which were attached the porticos where the choragists arranged the processions of the chorus. DONALDSON, *Greek Theatre*, in STUART, *Antiq. of Athens*, fol., Lond., 1830, iv, 41; 43. It was also called "postscenium". 1.

PARASTAS or PROSTAS. A Greek term for the space enclosed between the antæ to the entrance of a private house; it is also supposed to have meant the *pronaos*, without the columns, between the antæ of a temple; VITRUVIUS, vi, 10. EURIPIDES, *Iph. in Tauris*, 1126; or the vestibule of a palace. *Phœn.* 415. The terms *prostas*, *parastas*, and perhaps *pastas*, and also *prodomos*, were given to the chamber or vestibule on the south side, or that opposite the *mesaulos thura* of the peristyle of the *gynæconitis*; on each side of the opening for this vestibule was an anta. 78

PARASTATA. This Greek term is used by VITRUVIUS, iii, 1, who most probably meant to convey the idea of engaged pilasters, showing only one complete face. The term has also been taken as synonymous with *antæ*, whether as a pilaster or a pillar; the word *parasta* better expresses a PILASTER, sometimes diminished, and showing only a small part of its returns, while the term *anta* may be supposed to express a similar pilaster with a projection of half its diameter, or showing two sides of the square plan, rarely, if ever, diminished. ORTHOSTATA. 78.

PARATE (JEAN), of S. Geniez d'Olt (Rouergue), built 1671 the bridge of S. Geniez, over the river Lot; in 1672 the chief portail and two galleries of the old convent of the Dominicans at Rodez conjointly with Jacques Lacroix, another architect of S. Geniez: also, about 1704, the principal mass of the episcopal palace at Rodez: and it is believed the church of Notre Dame at Milhau. GAUJAL, *Etudes Hist.*

PARATHURA, dim. parathurion. The Greek term for the back door of a house, called by the Romans, posticum, postica, or posticula; CICERO, post. Red. 6, also calls it pseudothyron, or false door, as opposed to Janua, the front door. 78.

PARATORIUM. One of the names for the place at the east end of a basilican church, usually on the north side, for the offerings; in some Greek churches it appears to have been on the south or right hand side, of the edifice. It is also called *oblationarium*, *prothesis*, and *paratrapegon*, by later writers; its early name is unknown. BINGHAM, *Origines*, 8vo., Lond., 1840, ii, 457; ECCLESIOLOGIST *Journal*, 8vo., Lond., 1847, vii, 188. DIACONICUM.

PA-RA-WA. A small hard red wood, of Amherst and Arrakan, East Indies, not attacked by insects. 71.

PARCEL GILT. A work of silver which is divided into portions by gilding, and not wholly "silver-gilt".

PARCELLING. Covering with tar and hair all iron work under water, before the lead sheathing is brought over it, in order to defend the iron against the action of salt water; HALES, *Milled Lead*, 12mo., Lond., 1691, p. 25-6.

PARCHAUSER (BALTHAZAR), court architect, considerably repaired, 1608, the slender old German tower of the parish church of S. Michael at Vienna, erected 1220. 26.

PARCHMENT (It. *pergamena*; Fr. *parchemin*; Ger. *pergament*). The skin of an animal, such as a goat, or sheep chiefly in England, prepared by the leather dresser and currier, and used for writing and painting upon; a coarser sort is made of the skin of a pig. A finer, smoother, and whiter sort, called vellum, is made of the skin of a calf, kid, or lamb. For other and coarser purposes, the skin of an ass, calf, wolf, or he-goat, is used. Parchment is said to have been invented at Pergamus, about B.C. 197-159, in consequence of the prohibition of the export of PAPYRUS from Egypt by Ptolemy Epiphanes. The word is said by MABILLON to be first found in the works of Tatto, a monk of the fourth century; the previous term being usually *membrana*, as in the Greek Testament, 2 TIMOTHY, iv, 13. 14.

Parchment of calf's skin was used for illuminated manuscripts. The mode of preparing, gilding, and colouring it, are detailed in the translations of early manuscripts, in TYMMS and WYATT, *Art of Illuminating*, 4to., Lond., 1860, p. 71, et seq.: BRADLEY, *Manual of Illumination*, 8vo., Lond., 1861, 6th edit. JEWITT, *Manual*, 8vo., Lond., [1860]. SHAW, *Handbook of the Art of Illumination*, fol., Lond., 1866. It was likewise used for drawings of designs for edifices; DRAWING; and PALIMPSEST. Directions for "staining paper or parchment of various colours";—as yellow by French berries, and turmeric; red by water of Brazil wood, by red ink, by dragon's blood, or by Indian lake; green by verdigrease in vinegar, or by copper in aquafortis; blue by indigo, or first green by copper and treated afterwards with pearlashes; orange, first by turmeric and then by fixed alkaline salt; and purple by archal, or tincture of logwood, or the juice of ripe privet berries; are given by DOSSIE, *Handmaid to the Arts*, 8vo., Lond., 1764, i, 519-21.

To COLOUR on parchment now presents some difficulties. It is recommended to;—Rub the skin clean with india-rubber, then wash it over with clean water, and when nearly dry, colour in the usual way, adding a little ox-gall to it: the black lines should be kept faint to prevent the ink running into

the tint. Also, alum dissolved in as much water as it will take up, to be used in lieu of plain water, will prevent the blotches appearing: Builder *Journal*, 1845, iii, 518. Building News *Journal*, 1867, xiv, 135, 151: and xx, 234, where it is suggested the alum water may be laid over the drawing after it is inked in, well saturating it, and when dry the alum brushed away. Much depends on the quality of the skin; it should be thick, with a perfectly smooth surface, and if possible without any blemishes in the portion to be coloured. After drawing the plan, the boundary lines may be lightly inked in; the skin then rubbed with prepared or powdered chalk, and any powder left on the surface is removed: a little ox-gall water is to be added to the tint, the skin being laid sloping on a board, but not affixed, and the colour floated down as fast as possible; the edges can be touched up afterwards if necessary. When quite dry, the inking in may be continued; same *Journal*, 1876, xx, 211. An additional precaution suggested is, whilst the colour is drying to lay on it a piece of clean blotting paper pressed down by a weight (p. 385). Other suggestions comprise first rubbing the parchment with rough paper or very fine glass paper until there be no grease remaining. A wash of diluted gum-water over the skin before colouring stops the pores, and tends to produce an even tint. A little ox-gall with the colour will also assist.

PARCHMENT PAPER. A strong tracing paper, stated to be made by taking an unsized paper and soaking it in a liquid composed of 2 parts of concentrated sulphuric acid and 1 part of water. It is prepared ⅞ths wide.

PARCLOSE or Perclose. A closet; or an enclosure, screen, or railing, to separate a chapel from the body of a church, to form a gallery, etc.; it is either open or close. In an agreement, 28th Feb. 1375, respecting the church at Kingston, Surrey, the prior and convent were to "repair—the chancels—and of the chapels annexed thereto—; and also the divisions commonly called *perceloses* between the nave and chancel of the church and chapel aforesaid: and the charge of making the said chancels, and of repairing and rebuilding the same, with the divisions aforesaid—" were to be borne by them: Manning and Bray, *Surrey*, fol., Lond., 1804, i, 388. In the agreement 1450 for the Beauchamp chapel, Warwick, "The carpenters do covenant to make and set up finely and workmanly a par-close of timber about an organ loft ordained to stand over the west dore of the said chapell according to pattern:" Britton, *Arch. Antiq.*, 4to., Lond., 1814, iv, 11. A small balcony, or gallery, still remains over the doorway, and is supposed to be the lower part of this parclose. The term also occurs 1558, Flixton church; "makyng of a p'closse or trav'se of tymber ovthaward ye sayd pishe church"; Chetham Society, *Lancashire Wills*, 4to., 1857, i, 81. The term would appear to have been dropped, for in bishop Montague's *Visitation Articles*, 1638, is the question, "Is the chancel divided from the nave or body of the church with a partition of stone, boards, wainscot, grates, or otherwise?" The term parclose is used in the *Instrumenta Ecclesiastica* of the Cambridge Camden Society, 4to., Lond., 1847, pl. 31. 5. 17. 19. 22.

The words "parclose-screen" used occasionally would appear to be tautology; thus, "the choir itself (at Augsburg cathedral) is surrounded by a high parclose-screen of stone in open tracery of varied design", Webb, *Cont. Eccles.*, 8vo., Lond., 1848, p. 132. Also in the Ecclesiologist *Journal*, 1844, iii, 34; reprinted in Civil Engineer, etc. *Journal*, vii, 179: and by many other writers. Chancel aile. Jubé. Rood-screen. Screen.

PARDINI (Guiseppe), of Lucca, where he executed several works previous to 1830, when being at Rome he made drawings of the antiquities in that city, given in Burgess, *Topog. and Antiq.*, 8vo., Lond., 1831, and referred to p. xii. He wrote *Descr. del Circo sullo Via Appia*, etc., 8vo., Rome, 1829. A drawing "Trofei Dacici nella Colonna Trajana", dated 1819, is in the library of the Institute of British Architects. Nagler states that he made the design for the beautiful golden lamp, which since 1836 hangs before the picture of the Redeemer (probably at Rome), his design being selected from among twelve others, by the academy of S. Luke.

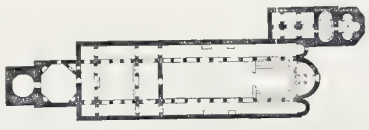
PARÉ (Robert), architect to duke Charles of Orleans. On Oct. 4, 1415 he certified to the *receveur* of the duke, that Hannequin, glazier at Orleans, had made and delivered certain glass at "l'ostel de M. S. le duc à la venue du roi Loys et de la royne sa femme". In 1418, with Etienne Gaudin, he succeeded Arnault de Lully as director of the important works executed at this time to the fortifications of the town of Orleans. Buzonnière, *Hist. d'Orl.* De Laborde, *Ducs de Bourg.*

PARELL. This term occurs in the item "for the settyng of vij new parells in vij chymneys of the foreseid chambres of Rygate stone ev'y parell' v fote in wydnes"; *temp.* Henry VIII. Bayley, *Hist. of the Tower*, fol., Lond., 1824-5, pt. i, App. xxix. It is not explained; but the *Glossary* states that the term is derived from Fr. *appareil*, a chimney-piece; a set of dressings or ornaments for a fire-place; etc. 17. 19.

PAREMBOLE of Antoninus, a city of ancient Ethiopia, is supposed to be represented by the modern Dabôd, Deboo, Debot, Debout, and Déboud, near to and south of Philæ. The ruins consist of a temple dedicated to Isis, founded by Ashar-Amun or Atar-Amun, a monarch of Ethiopia, who was probably the immediate successor of Ergamun, the contemporary of Ptolemy Philadelphus (B.C. 285-247). Augustus and Tiberius added most of the sculptures, which are still unfinished. It has now three detached pylons, which lessen in length, the first being 86 ft. 6 ins. long and 23 ft. high, before arriving at the temple, which is 38 ft. 9 ins. wide and 66 ft. 3 ins long. The whole is surrounded by a wall starting from the first pylon. At some distance before the temple is a stone quay, which had steps leading from the river. Gau, *Antiq. de Nubie*, fol., Paris, 1822, pl. 2-6. Ramée, *Manuel de l'Arch.*, 12mo., Paris, 1843, i, 215. Hamilton, *Ægyptiaca*, 4to. and fol., Lond., 1809, p. 43. 28.

PARENT (Mathurin) was 1510 architect of the hôtel de ville at Cambrai. *Rev. des Soc. Sav.*, 2 Series, v. Lance, *Dict. Biog.*, 8vo., 1872.

PARENZO. A seaport of Illyria, situated on the Adriatic. It is the see of a bishop, and has a cathedral dedicated to the Assumption of the Virgin, and under the invocation of SS. Martyri Eleuterio vescovo e Mauro prete Africano. It was completed 526 (Strangford), or 539-43, the time of Justinian, and is one of the oldest Christian churches existing. An atrium surrounded by porticos precedes the church, which is a two-ailed nave with a chapel; transepts and other chapels have been added: at the entrance of the court is an octagonal baptistery, in front of which is the tower. At the other end of the church is



the ancient tribune, with fine mosaics, of X or XI cent. Attached to the north-east end is a chapel or crypt of S. Andrea, whose age and use seem obscure. The capitals of the columns in the basilica are said to be of the same design as those at Sta. Sophia at Constantinople, which edifice was founded about the same date as that at Parenzo. Allason, *Pola*, fol., 1819, p. 5, notices "the foundation of a temple of the Corinthian order, of which two columns remained in tolerable preservation". Lohde, *Der Dom von P.*, 7 pl., fol., Berlin: from which the plan and description are copied in Ecclesiologist *Journal*, 1861, xxii, 292; in Neale, *Notes—on Dalmatia*, etc., 8vo., 1861. Eitelberger, *Mittelalter. Denkm.*, etc., 4to., Vienna, 1861, whose plan varies a little from the above woodcut. Hübsch, *Altchrist. Kirchen.*, fol., Carls., 1858, etc., pl. 17, 20, 29, and 55. Seroux d'Agincourt, *Architecture*, pl. 68, fig. 7; pl. 69, fig. 11 and 12;

and pl. 73, fig. 9. STRANGFORD, *Eastern Shores of the Adriatic*, 8vo., Lond., 1862, p. 291-3. 28. 96.

PARERGA. A Greek term, signifying in architecture the additions or complements to the principal work, which serve no other use than that of ornaments. 4. 25.

PARETTA WORK (from Fr. *paroître*, to appear; or It. *paretta*, a small net). A species of rough cast, being plastering finished with a coat of lime, with pebbles of a largish size pressed all over it. They are not covered with limewash or colour, but exhibit their own surfaces, and the whole becomes enriched by the white reticulation of the plastering in which they are set. The colours of the pebbles should be selected with taste, as much of the beauty of the whole will depend on their fitness to harmonise with those hues by which they are surrounded; PAPWORTH, *Rural Residences*, 8vo., Lond., 1818, p. 14.

PARGEBOARD, see BARGEBOARD.

PARGET. PERGET, PERGEN, PARGE WORK (Fr. *épigeonner*, to parget). A term derived probably from the Lat. *perjactari*, as used in the Liberate Roll, 28 Henry III (1243-44), where the tower of the castle of Corfe is to be "pargeted" with mortar where needful, and the whole to be whitewashed externally; TURNER, *Domestic Arch.*, 8vo., Oxford, 1851, i, 202: where it is stated that in the XIIIth century the sort of "pargeting" then employed seems to have been confined to filling up the crevices and fissures in walls with mortar or cement, and "pointing" as then understood would appear to have been the "imitation of ashlar work on the plaster surface of internal walls": 1853, ii, p. 25. SURTEES SOCIETY, *Finchale Priory*, 8vo., Newc., 1837, p. 440. DALLAWAY, *Discourses*, 8vo., Lond., 1833, p. 175, has "Parget, a smoothed wall. *Pargitor, parietor, cementarius*". In NEVE, *Dict.*, 1736, "pargeting" is the same as plastering; a manuscript note of the writer's copy of the work states that the article does not notice "pargeted floors". PLASTERING. 5. 17.

The term has come to be applied to a composition for plastering or lining the inside of flues to form an even surface up which the smoke can ascend, and the soot adhere, and be swept clean when necessary: it resists heat to a very great degree. *Pargetting mortar*—"is also very good for to point common pan-tiling, etc., and is thus made:—to one heaped bushel of fine screened clear lime add about a fourth part of fresh horse dung (cow-dung is now used), clear from dirt and straw; which incorporate with the lime by well beating it.—These ingredients will make 2½ hods of mortar": LANGLEY, *London Prices*, 8vo., Lond., 1750, p. 46. "It being desirable that every part of a chimney should be air-tight, the work should be executed either with cement, or with the very best description of mortar mixed with tile dust, to prevent it from settling—and plastered with cement or with a superior kind of mortar instead of the common pargetting. CLAVERING, *Construction of Chimneys*, 8vo., Lond., 1779, p. 51-2, recommends that the mortar should be mixed with coal ashes to give it the property of cement, and that the pargetting should be composed of 2 parts of stone (or Dorking) lime, 1 part of fine drift sand, and 1 part of coal ashes or of brick dust for the first coat, and of fine plaster of Paris mixed with stale small beer, for the second. In the new King's Mews barracks, the pargetting consisted of 1 part of Dorking lime, 1 part of brick dust, and 2 parts of river sand;" PASLEY, *On Brickwork*, 4to., lith. Chatham, 1826, p. 203. Mortar made with one peck of salt to each bushel of lime, adding as much sand and loam as will render it fit for work, and then laid on as a thick coat. If the chimney has no offsets for the soot to lodge on, it is said it will remain perfectly clean, and free from all danger of taking fire; BUILDER *Journal*, 1846, iv, 371.

PARGET WORK. The term for the plastering used between the studwork on the outside of half-timber houses, when it was usually covered with devices stamped into it, or scored over it. By some this has been supposed to mean the same as FRETWORK: and is explained as "decorative plaster-work, in raised ornamental figures, adopted in the XVI and XVII cents. for the internal and external decoration of houses", (FAIRHOLT, *Dict. of Terms*). It is described as "a peculiar kind of finished plasterwork, for external or internal work, with raised or indented patterns, much used in houses of the Tudor period", in BRITTON, *Gloss.*, who adds "Opus albarium is defined in HEMING, *Nomenclature*, p. 198*b*, as 'white liming worke or pargetting worke'", which does not bear out the definition of BRITTON. Plasterers are still (1838) termed pargettors in some parts of England. 19.

Adjoining the churchyard at Wyvenhoe in Suffolk, in a place called the garrison, is a piece of pargetting work, which nearly covers one side of a house, and is considered a remarkable specimen of its sort executed in the XVII century. It has been described, with a plate, by PIGGOT, *Notes on Pargetting*, in ESSEX ARCHÆOLOGICAL SOCIETY, *Transactions*, 8vo., Lond., 1873, v, 73.

PARIAN OR STATUARY BISCUIT. Various porcelain biscuits, so called, are specially used for statuettes, busts, and other articles for which it is desirable to get the appearance of white marble. It is a kind of hard porcelain made from a mixture of kaolin and felspar, in which the degree of hardness or fusibility is regulated by the proportion of one material towards the other. —The light being allowed to penetrate to some depth below the surface, imparts to these biscuits a softness which is wanting in the similar productions of Sèvres, Germany, and Denmark: BEVAN, *British Manufacturing Industries; Pottery*, 12mo., Lond., 1876, p. 45. BISCUIT.

PARIAN CEMENT. Formerly known as Keating's patent, is a quick setting white cement. The patent enrolled 11 Aug. 1846, states that 5 lbs. of borax and 5 lbs. of crude tartar are each to be dissolved in 6 gallons of water, and when dissolved the two solutions are to be mixed together. Gypsum in lumps (first deprived of its water of crystallisation by heat) is to be put in this solution till it has absorbed as much as it will take up, and then put in an oven and heated red hot; then allowed to cool, and ground, and then again mixed with the above solutions and heated in an oven; when taken out it will be ready for use: CIVIL ENGINEER, ETC. *Journal*, 1846, ix, 285. Sulphate of lime (gypsum) 87·2, sand 2·0, water 9·6, and borax 1·2, are also proportions stated for it: it is now made of dehydrized gypsum saturated in a solution of borax. HYDRO-BORONATED PLASTER. BORAX.

It is stated in favour of this cement, that it can be used for internal stucco instead of common plastering; it may be painted and papered within 24 hours (48 in 1860) of its application to the bare walls, so that rooms may soon be rendered habitable; that it is worked without difficulty, the labour being easier and less expensive than other stuccoes; that a finer quality is prepared for mouldings and scagliola work, ornamental plastering, etc.; that several colours can be mixed with it for uniform tints in decorative work; that it sets in four or five hours, and requires as little water as possible; while in the finishing coat it is desirable to mix one bushel of fine Portland stone dust with two bushels of coarse Parian; that it can also be used for floors; and that it does not effloresce. Directions for use are given by the manufacturers, Messrs. Francis and Co. It was used throughout the Houses of Parliament, at Westminster.

The BUILDER *Journal*, 1863, xxi, 509, notices a remark of Owen Jones that "Parian cement has always played me false wherever I have used it. The salt works through whatever you put upon it. It would be wiser always to make your client wait rather than use it for this purpose". At S. James's Hall, Piccadilly, the ceiling was done in Parian on lath, and the walls in distemper on Parian. The saltpetreing is also noticed 1872, xxx, 309, 323; and perhaps accounted for p. 351. As all plastering "sweats", Parian even should not be painted upon for 6 or 9 months after completion; BUILDING NEWS *Journal*, 1875, xxix, 520; but denied "if good", p. 547, and 576.

PARIAN MARBLE; see PAROS.

PARIES. The Roman term for the walls of a house; in contradistinction to *murus*, the wall of a city; and *maceries*, a small enclosure, such as a courtyard. 78.

PARIETING. A word that occurs in the passage "glazing, paving, parieting of God's house"; Bishop HALL, *Works*, vi, 115, Tallboy's edit., 1837: probably derived from "pariette for walles, *blanchissure*", in PALSGRAVE, for PARGETTING. PARGET. 17.

PARIGI (ALFONSO DI SANTI), of Florence, was a pupil of his cousin B. Ammanato, and after the death 1574 of Vasari, completed the ufizi nuovi, in that city, and died 1590. 30. 68. 113.

PARIGI (GIULIO), son of ALFONSO, became a disciple of Buontalenti, and a military engineer, and being talented in drawing, mathematics, and mechanics, he was selected to teach the four sons of the grand duke Ferdinand I of Tuscany, who later on lavished their favours on him; and for whom he directed the magnificent fêtes in celebration of the marriage of the grand duke Cosmo II, and for the reception of queen Maria in 1612. About 1575-1600, he designed the staircase in the monastery of S. Giovanni Evangelista de' Padri Scolopi, or S. Giovannino, at Florence, enlarged 1579 by Ammanato, to whom A. and G. Parigi were assistant engineers, and who kept a book of the work, said to be still in existence, on his bridge at Florence (VULLIAMY, *Bridge*): the works of completion at the palazzo de' Pitti, 1620-31 are mentioned in ANGUILLESI, *Not. Storiche del pal.—Toscana*, 8vo., Paris, 1815, p. 76-7; and in FAMIN, pl. 2; modernised or designed about 1622 the villa del Poggio imperiali (formerly Baroncelli, attributed to G. Coccapani in MILIZIA, plan given in LECLÈRE, *Recueil d'Archi.*, fol., Paris, 1826, pl. 65); designed the monastery of La Pace belonging to the padri de S. Bernardo outside the porta Romana; the staircase to the dormitory in the monastery of Sto. Spirito, or of the padri de' Augustiniani; the palazzo Marucelli (given in RUGGIERI, *Studio*, fol., Florence, 1722, iii, pl. 63-8): completed Buontalenti's façade to the arcispedale di Sta. Maria Nuova; and was employed with G. Mechini to repair the pergamena of the cathedral at Florence, for the grand duke Ferdinand I. MILIZIA states that Giulio died in 1590, but this must be an error; the date is put "16...", by BALDINUCCI, 1846, iv, 121, who gives many pages to his memoir, and states he was buried in the church of S. Felice in piazza: NAGLER adds that he died in 1635; and that two plates out of seven of the decorations for an opera on the marriage 1608 of the grand duke, are drawn and engraved by Giulio from his own designs; and names three other plates. He also gives to Giulio the works at the cathedral at Florence, not to ALFONSO, who was one of his seven sons. It is said that Giulio was the first to etch small-sized figures, and that Callot learnt of him. 3. 25. 32. 68. 113.

PARIGI (ALFONSO), born ....., son and pupil of GIULIO above mentioned, served as an engineer in Germany, and on his return completed a number of his father's edifices at Florence. He restored the second floor of the palazzo Pitti, which was about 8 ins. out of the upright (MILIZIA, in the translation 1826, is made to say a floor out of the level) by means of chains, screws, and levers: and also continued, after his father's design, the left wing, serving to complete the palazzo in 1620, but some portion seems to have been abandoned after the walls were raised, on account of the difficulty of making the windows range (VASARI, *Lives*, edit. 1850, i, 456, s. v. Brunellesco). FAMIN et GRANDJEAN, *Arch. Toscane*, fol., Paris, 1846, pl. iii, state that towards 1640 he brought the walls of the façade to the upright, and executed the gallery on the right of the court, his father having designed and erected the other one. He designed the palazzo Scarlati, one of his best works (given in RUGGIERI, *Studio*, iii, pl. 40-45): and repaired the banks of the river Arno, which had burst, but this work received so much opposition from his rivals that it cost him his life: he also designed 1619 the palazzo de' del Borgo; 1619 the loggie del grano; modernised 1621 the albergo di Mendicanti, now the scuole de S. Salvadore; was 1634-36 consulted on the works at the cathedral at Florence; and completed the works by Ammanato to the monastery of S. Giovanni Evangelista, which were finished 1661. In 1640 he modernised or designed the first cloister of the Tuscan order of Sto. Spirito, separated by iron grilles 1683 and the refectory from the second one 1564-9 by Ammanato; (FAMIN, pl. 75). He died 17 Oct. 1656, and was buried in the church of S. Felice in Piazza. QUATREMÈRE DE QUINCY, *Vies.* ANGUILLESI, p. 82, 91. LA METROPOLITANA FIORENTINA, 4to., Florence, 1820, p. 58, 65, 67. BALDINUCCI, 1846, v, 52. BARTSCH names some plates of decorations, and of an opera, as engraved by Alfonso. 3. 25. 32. 30. 68. 113.

PARING OR PAREING CHISEL, used by joiners, to smoothen the irregularities made by the *former* chisel: see CHISEL. MOXON, *Mechanick Exercises*, 4to., Lond., 1693, art. Joinery, p. 72. A paring or slotting machine, is used by engineers; BUCHANAN, *Millwork*, 8vo. and fol., Lond., 1841.

PARIS (Lat. *Lutetia*, the chief town of the Parisii, which stood on the present island of La Cité, formed of three small ones). The capital of France, situated on the river Seine. In the reign of François I, the fortifications were repaired and strengthened; the circuit was enlarged by Charles IX, 1566, so to include the palace of the Tuileries, the residence of the king being the Louvre, a fortress of ancient date, and then being gradually rebuilt. Its limits were defined by the wall erected for fiscal purposes by Louis XVI; it was 5 miles by $3\frac{3}{4}$ miles; this area included about 8,500 acres or $13\frac{1}{4}$ square miles. During 1841-2, the city was surrounded with fortifications at an expense of about 20 millions sterling, and with outworks composed of 14 detached forts. In 1866 it was calculated that the space in London is about 1,220 sq. ft. to each person, whereas in consequence of the confinement of the city by the wall, the Parisians have each only 550 ft. So much has been done for the improvement of the city, that during seventeen years previous to 1870, the expenditure had been 1,117,500,000 fr. (£84,700,000). A paper by TITE, *On the Paris Street Improvements*, was read 14 Dec. 1836 at the Institute of British Architects; and 10 Jan. 1859 by PANSON, *On the Recent Improvements in Paris and their cost*, reprinted in BUILDER *Journal*, 1859, xvii, 149.

The following list No. 1 gives the names of architects *deceased* prior to January 1878, who have been engaged in Paris on works of public utility. Those to whose names the mark * is attached, have died since the publication of this *Dictionary* reached the alphabetical places in which biographical notices of them would have been inserted.

LIST No. 1.—ARCHITECTS.

Alavoine, J. A.	Brosse, J. de	Delespine, P. J.	Gadyer, P.
Androuet, see du Cerceau	Bruand, J.	Derrand, F.	Galopin, —.
Ange, M.	Bruand, L.	Desargues, G.	Gamard, C.
Antoine, J. D.	Brunet de Baines, F.*	Desbrosses, S. or J.	Garnier, see Dille
l'Assurance, —, see Cailleteau	Bullant, J.	Desgots, F.	Gau, F. C.
Auberts, —.	Bullet, P.	Desmaisons, P.	Gauché, F. T.
Bachelier, N.	Cailleteau, —.	Dille, J. C., see Garnier	Gauthier, M. P
Bailly, A. N.	Caristie, A.	Dorbai, F.	Giocondo, G.
Ballu, T.	Carpentier, M. le	Doucet, J.	Girard, —.
Baltard, L.	Cartaud, S.	Duban, F.*	Girardin, —.
Baltard, —.*	Célerier, J.	Dubois, P.	Girardini or Giardini, —.
Barlaud, G.	Cerceau, J. B. du	Dubreul, J.	Giraud, J.
Beaumont, C. E.	Chalgrin, M.	Duc, G. le	Gisors, A. & G. de
Blond, J. B. A. le	Chambiche, —.	Dulin, —.	Gittard, D.
Blondel, F.	Charpentier, J.	Dumont, G. P. M.	Gobert, —.
Blondel, J. F.	Chelles, J. de	Duperac, E.	Godde, E. H.
Blouet, G. A.	Chevarcau, N. M.	Duquesne, F. A.	Gondouin, J.
Boffrand, G. de.	Clerisseau, C. L.	Durand, J. N. L.	Goujon, J.
Bonnard, J. C.	Contant, P.	Enguerraud, —.	Goulet, N.
Bonnevie, E. J.	Cormont, F. de	Errard, C.	Gourlier, C. P.
Bouchardon, E.	Cotte, R. de	Fain, P. de	Goust, —.
Boullan, J. B. V.	Cotte, J. R. de	Famin, A.	Grand, J. G. le
Boullée, E. L.	Couey, R. de	Fontaine, P. F. L.	Grand, J. le
Brébion, M.	Courtonne, J.	Franque, F.	Grand, — le
Bronguiart, A. T.	Couture, G.	Gabriel, J.	Grillon, E. J. L.
	Debret, F.	Gabriel, J. A.	Grisart, J. L. V.

Guarini, C. G.
Guenépin, A. J. M.
Guillaumot, C. A.
Guillot, A.
Happe, —.
Henry, —.
Heurtier, J. F.
Hittorff, J. I.*
Horeau, H.*
Hubert, —.
Hujet, G.
Hurtault, M. J.
Huvé, J. J. M.
Huvé, J. J.
Huyot, J. N.
Ingelramme, see Enguerrand
Jocunde, —, see Giocondo
Joubert, L.
Joubert, C.
Joue, J. de la
Joui, see Mansart
Krafft, J. C.
Labrouste, H.*
Lacornée, J.
Lalye, M.
Lambert, P. de
Lassurance,—, see Cailleteau
Lassus, J. B. A.
Lauchenu, J. F.
Lebas, L. H.
Lebrun, L.
Leclère, A. F. R.
Lecointe, J. F. J.
Lecomte, —.
Ledoux, C. N.
Lefebvre, —, or Lefevre
Legrand, —.
Leloir, —.
Lelong, P.
Lenoir, N.
Lepère, J. B.
Lescot, P.
Letarouilly, P. M.
Levé, P.
Libergier, H.
Lievain, —.
Lisle, P. de,
see De l'Ile
Louis, V.
Maignaud, P., see Mignard
Maire, — de la
Mandar, C.
Mangin, C.
Mansart, F.
Mansart, J. H.
Mansart, J. H.
Mansart de Jouy
Marchand, G.
Marot, J. and D.
Mazois, F.
Meissonier, G. A.
Mercier, J. le
Métézau, T. M.
Métézau, L.
Métézau, C.
Mignard, P.
Mique, R.
Modena, N. da
Moine, J. P. de
Molinos, —.
Mollet, A. C.
Monsiaux, P. da
Montereau, P. de
Montreuil, E. de
Moreau, J.
Moreau, J. C. A.
Moreau Desproux,
P. L.
Mouret, —.
Muet, P. le
Normand, C. P. J.
Nôtre, A. le
Oppenordt, G. M.
Orme, P. de l'
Orme, T. de l'
Orme, J. de l'
Orme, P. de l'
Palloy, P. F.
Patte, P.
Pautre, A. le
Payet, —.
Percier, C.
Perrac, E.
Perrault, C.
Perronet, J. R.
Petit-Radel, —.
Peyre, A. F.
Peyre, M. J.
Peyre, A. M.
Pierron, A.
Polenceau, —.
Poussielgue, E.
Poyet, B.
Primaticcio, F.
Provost, J. L.
Puget, P.
Raymond, —.
Renard, J. A.
Riche, Enguerrand le
Richer, J.
Robault de Fleury, C.
Robault de Fleury, H.
Rondelet, J.
Roux, J. le
Roy, J. D. le
Sambin, H.
Servandoni J. N.
Soufflot, J. G.
Tancvot, —.
Temple, R. du
Texier, C.
Thibault, J. T.
Thierry, J. E.
Van Cleemputte, H.
Van Cleemputte, P. L.
Van Cleemputte, L. T.
Vau, L. le
Vaudoyer, A. L. T.
Vaudoyer, —.
Vellefaux
Viel, C. F.
Vignon, B.
Villers, M.
Visconti, L. T. J.
Vouet, S.
Wailly, C. de

It has been considered undesirable to devote to this metropolis the great number of pages required by a detailed account on the system prescribed for this *Dictionary* in regard of other cities: because the facts are readily found by means of the preceding list, supplemented by the following titles of books, which supply an ample index to the sources of general or particular information not usually given in *Encyclopædias* and *Gazetteers*.

List No. 2.—Histories, etc.

Le Roux de Lincy, *Descr. de la ville de Paris au XVe siècle, par Guillebert de Metz*, 8vo., 1855. Sauval, *Hist. et Recherches des Antiquités de la ville de P.*, 3 vols., fol., 1724. Lebeuf, *Diss. sur l'histoire Eccles. et Civile de P.*, etc., 12mo., 1739-43. Brice, *Descr. de la Ville de P.*, 12mo., 1725. Felibien, *Hist. de la ville de P.*, 5 vols., fol., 1725. Lebeuf, *Hist. de la Ville et Diocese*, 12mo., 1754. De la Force, *Descr. hist. de la Ville de Paris et de ses Environs*, 12mo., 1765. Jaillot, *Recherches crit. hist. et topog. sur la ville de P.*, 8vo., 1775. Béguillet, *Descr. hist. de Paris et de ses plus beaux Monumens*, 3 vols., 4to., 1779. Saint Victor, *Tableaux hist. et pitt. de Paris depuis les Gaulois*, 350 pl., 3 vols., 4to., Paris, 1808-11. Dulaure, *Hist. de P.*, 8vo., 1823. Dulaure, *Hist. des Environs de P.*, 8vo., 1825. Dufey et Béraud, *Dict. Hist. de P.*, 8vo., 1825. Dufey, *Dict. des Environs de P.*, 8vo., 1820; 1825. Anon., *The History of Paris from the earliest period*, etc., 3 vols., 8vo., Lond., 1825; 1827. Brun, *Manuel Complet du Voy. dans P.*, 18mo., 1828. Dulaure, *Hist. Physique, Civile et Morale de P.*, 10 vols., 8vo., 1829. Lenoir, *Statistique Mon. de Paris; Cartes, plans, et dessins*, 3rd Series, Archéologie, 300 pl., fol., 1839, etc. Roquefort, *Dict. des Monuments de P.*, 8vo., 1826. Leleux, *Dict. Hist. et Topog.*, 8vo., 1838. De Gaulle, *Nour. hist. de P.*, 5 vols., 4to., 1841. Girault de S. Fargeau, *History of the 44 districts of Paris*, 4to., 1847. Tisi, *Les édifices de Paris et leur architecture*, 8vo., 1860. *Histoire Général de Paris*, par le Conseil municipal; containing Berty, *Topog. Hist. et Archéol. du vieux P.* (Louvre and Tuileries), 2 vols., 4to., 1866-8; *Plan parcellaire restitué;* Legrand, *Paris en 1380, etc.*, plan, etc.: Leroux de Lincy et Tisserand, *Paris et ses historiens aux XIVe et XVe siècles*, 4to., 1868.

List No. 3.—Maps and Plans.

Guenebault, *Dict. Icon. des Monuments*, 8vo., Paris, 1843, notices plans dating 1540; 1560; 1563; 1567; 1576; 1598; that of Saint Victor, temp. Charles IX; and of 1607. Gomboust, *Plan de Paris dressé en* 1649, gravé en fac-simile par Lebel, fol., 1858; with *Notice sur le plan de P. de J. G.*, publié pour la première fois en 1652, etc., par P. P., 8vo., 1858—publié par la Société des Bibliophiles Français. Silvestre, *Plans de P.* (palaces and churches), fol., 1661. Bretez, *Plan de P.*, 20 pl., atl. fol., Paris, 1734-39. Society for the Diffusion of Useful Knowledge, Nos. 196 and 197, and the Environs No. 198, fol., Lond., 1847. Jacoubet, *Atlas Générale de la Ville, des faubourgs, et des monuments de P.*, fol., 1836. Bonnardot, *Etudes Archéologiques sur les anciens plans de P. des XVI, XVII, et XVIII siècles*, 4to., 1851-2. Mignon, *Paris, Banlieue et Fortifications; plan général divisé en fragments orientés*, 1856. *Plan de Paris, échelle de* 1-5,000. *Plan comprenant les Bois de Boulogne et de Vincennes. Plan rétrospectif tendu sur châssis (périmètre restraint à la ville seule). Atlas du plan du Paris par Arrondissements. Plan de Paris au* 1-10,000.

List No. 4.—Books of Views.

Corrozet, *Fleurs des Antiquités, singularitez et excellens de la ville de P.*, 8vo., 1532. Anon., *Abrégé des Antiquitez de la ville de P.*, 8vo., 1664. Dezallier d'Argenville, *Voy. Pitt. de P.*, 12mo., 1749; 1778, 6th edit. Dezalier d'Argenville, *Voy. Pitt. des Environs de P.*, 12mo., 1749; 1770. Pernot, *Le Vieux Paris, reproduction des monumens qui n'existent plus*, 80 pl., fol., 1839. Anon., *Délices de Paris et de ses environs*, fol., 1753. Anon., *Miroir de Paris en et du nouveau P.*, etc., 6 vols., 24mo., 1807. Anon., *Tableau de P.*, 8 vols., 8vo., Amst., 1782-3, new edit. Anon., *Tableau Hist. et Pitt. de P.*, 4to., 1808-11. R....., *Curiosités de P.*, etc., 8vo., 1716; 1719-23; 1733; 1742; 1778. Dulaure, *Nouvelle descr. des Curiosités de P.*, 8vo., 1791. Dula[illegible] A[illegible] *descr. des Environs de P.*, 12mo., 1786. Galignani, *Nouveau Guide de P.*, 12mo., 1814, and various editions to 1864; 1867. Planta, *New Picture of P.*, 12mo., Lond., 1819, 11th edit. Richard, *Guide aux Environs de Paris*, 18mo., 1836.

Du Breul, *Antiquitez de P.*, 4to., 1612; 1616. Silvestre, *Recueil de* 100 *vues de P., Rome*, etc., fol. (*cir.* 1678). Anon., *L'entrée Triomphante de leur majestez Louis XIV—et Marie Therese*, fol., 1662. *Festes à l'occasion du mariage de madame Louise Eliz. de France et de dom Philippe infant d'Espagne*, 29 et 30 *Août* fol., 1740. *Fêtes Publiques—à l'occasion du mariage de Mons. le Dauphin*, 23 *et* 26 *Fevrier* 1745, fol., 1745 Benoist et Jacottet, *Vues de P.*, 42 pl., fol., . Rigaud, *Vues des palais, châteaux, etc., de P.*, 48 pl., fol., 1752. Anon., *Recueil de* 280 *planches des plus beaux Hôtels de Paris et Châteaux des environs de P.*, fol., 1770. Mareschal, *Paris et la province; ou Choix des plus beaux monuments d'Architecture*, 4to. 1787. Baltard, *Paris et ses Monumens*, fol., 1803-5. Segard et Testard, *Pict. Views in P.*, 19 pl., 4to., 1814. Scott and Nash, *Pict. Views of the city of Paris and its environs*, 4to., 1820. Pugin and Heath, *Paris and its Environs*, 200 pl., 4to., Lond., 1830-1; and in Bohn's Illustrated Library, 8vo., Lond., 1859. Turpin de Crissé, *Souvenirs de Vieux P.*; exemples d'architecture, fol., 1836. Courvoisier, 20 *Views of public buildings*, fol., 1842. Vaudoyer, *Patria; la France Anc. et Mod., etc.; Hist. de l'architecture*, 12mo., 1846. Mérimée, Viollet-le-Duc, and others, *Paris dans sa Splendeur*,—*Monts., rues, scènes historiques, etc.*, lith. par Benoit, etc., 100 pl., 3 vols., fol., Paris, 1861. Dardoize et de la Morandière, *L'Arch. Pitt., XIX siècle, par architectes de P.*, fol. *Paris Illustré* (Hachette) 1855. *Paris Illustré en* 1870 (Joanne). Paris Guide *par les principaux écrivains et artistes de la France*, 8vo., Paris, 1867, 2nd edit.

Anon., *Les Rues et Eglises de P.*, 4to., Paris, 1500. Saint Foix, *Essais historiques sur Paris*, 3 vols., 12mo., Lond., 1759,

new edit. Tynna, *Dict. Topog. hist. des Rues de P.*, 12mo., 1816. Nodier, *Paris Historique; Promenades dans les rues de P.*, 8vo., 1838-42. Lurine, *Les Rues de Paris ancien et moderne*, 8vo., 1844. Guilhermy, *Itinéraire archéologique de Paris*, 8vo., 1855.

List No. 5.—Accounts of Buildings, etc.

Legrand et Landon, *Descr. de P.*, 4 vols., 8vo., 1808-16 Roquefort, *Dict. des Monuments de P.*, 1826. Lafolie, *Notice du Monuments publics*, 12mo., 1820. Dulaure, Jorand, et Gilbert, *Antiq. Gallo-Romaines à Paris*, 4to., 1830. *Table of the chief Edifices* to 1839, in the Penny Cyclopedia, s. v. Paris; and reprinted in Civil Engineer, etc., *Journal*, iii, 203. Anon., *Paris; Its Historical Buildings and its Revolutions*, cuts, 2 or 3 vols., 12mo., Lond., 1849 (Knight). Guilhermy, *Descr. hist. des Monumens de P.*, 12mo., 1857. Fournier, Lacroix, etc., et Hoffbauer, *Architecture, Paris à travers les âges. Aspects successifs des Monuments et Quartiers hist. de Paris depuis le XIIe siècle jusqu'à nos jours*, fol., 1875-6. Vacquer, *Paris Gallo-Romain.*

Abbé Pascal, *Eglises de Paris*, 8vo., 1843. Chapuy et Joliment, *Cathédrale de P.*, 4to., 1826. Leconte, *Nôtre Dame*, fol., Paris (1841); and by Celtibère, 80 pl., fol., 1852-4. Guilhermy et Le Duc, *Descr. de N. Dame*, 12mo., 1856. Viollet-le-Duc et Lassus, *Nôtre Dame*, fol., 1868.

Morond, *Hist. de la Ste. chapelle*, 4to., 1790. Ducloux et Doury, *La Sainte Chapelle*, fol., 1865. Calliat, Guilhermy, et Lassus, *La Sainte Chapelle, après la restauration*, fol., 1857. Duban et Bœswillwald, *Peintures murales de Ste. Chapelle, XIII siècle*, in *Commission Hist.*, etc. Sauvageot, *Chapelle du château de Vincennes, XIV et XVI siècles*, 6 pl., in *Commission Hist.*, etc.

Bouillart, *Abbaye royale de St. Germain des Prez*, fol., 1724. Anon., *Remarques sur les Abbayes en supprimées dans les fauxbourgs de P.*, 8vo., 1792. Ruprich-Robert, *L'église et le monastère du Val de Grace*, 1648-65, 15 pl., 4to., 1875.

Boulencourt et Marot, *De l'eglise royale des Invalides*, fol., 1683; also by Félibien, 103 pl., 1706; 1740; also by Granet, 1736; also by Cochin, 1746; and by Pérau, 1756. Fontaine, *Chapelle expiatoire élevée à Louis XVI*, etc., fol., 1838. Anon., *Descr. de cette nouvelle église (S. Vincent de Paul)*, cuts, 4to., 1844. Calliat et Leroux, *Eglise Ste. Eustache*, fol., 1850. Gaulier, *Eglise de la Madeleine*, fol., 1850. Lesueur *La Madeleine*, etc., fol., . Chalgrin, *Eglise de St. Philippe du Roule*, fol., 1857. Ballu, *Eglise de la Ste. Trinité*, fol., 1868. Ballu, *Eglise Ste. Ambroise*, fol., 1874.

Chautard et Lejeune, *Tombeau de l'emp. Napoleon I*, 8vo., 1853. Lenoir, *Tombeau de Napoleon I*, 43 pl., 4to., 1855. Thury, *Hist. des Catacombes*, 8vo., 1815. Jolimont, *Les Mausolées Français dans Père la Chaise*, 4to., 1821-23. Normand, *Mons. funéraires choisis dans les cimetières*, etc., fol., 1832-36. Marty, *Promenades Pitt. aux Cimetières du Père la Chaise*, 4to., 1844. Acquier et Combes, *Les Cimetières de P.*, 5 pl., 8vo., 1852. Adams et Leveil, *Le nouveau Père la Chaise*, 43 pl., 4to., n. d.; and *Album des Monumens funèbres*, 30 pl., 8vo., 1860. Lasalle, *Père la Chaise*, 4to., 1835. Daly, *Architecture Funéraire*, fol., 1871. *See* Brongniart in next paragraph.

Clarac, *Descr. hist., etc., du Louvre et Tuileries*, 8vo., 1853. Lefuel, *Palais du Louvre et des Tuileries; Decorations*, fol., 1870: also *Les appartements privés de S. M. l'imp.—des Tuileries*, 20 pl., fol., 1868. Anon., *Antiquités du Luxembourg*, 26 pl., fol., . Dedaux, *Chambre de M. de Medecis au palais de Luxemburg*, fol., 1838. Gisors, *Palais du Luxembourg*, 8vo., 1847. Vatout et Fontaine, *Le Palais Royal*, 4to., 1829; 1834. Anon., *Notice sur le palais de la Chambre des Pairs de France*, 12mo., 1820. De Joly, *Chambre des Députés*, etc., fol., 1840. Gondouin, *Les écoles de Chirurgerie*, fol., 1780. Antoine, *Hist. de l'Hôtel des Monnaies*, fol., 1826. Rohault de Fleury, *Musée d'Histoire Naturelle depuis* 1833, fol., 1844. Sauvan et Smith, *Hist. et descr. pitt. du Palais de Justice, etc.*, fol., 1825-8. Duc, *Palais de Justice.* Brongniart, *Plans du Palais de la Bourse de Paris, et du cimetière Mont Louis*, fol., 1814. Vaudoyer, *Plan, etc., du palais de l'Institut Royale de France*, 8vo., 1837.

Calliat et Le Roux de Lincy, *Hôtel de Ville*, fol., Paris, 1844-56. Poyet, *Transferé, etc., l'Hôtel Dieu, etc.*, 4to., 1785.

Blondel et Lusson, *Marché St. Germain*, fol., 1816. Le Camus de Mezières, *Halle aux Grains*, fol., 1769. Brunet, *Dimension des fers, etc.*, 4to., 1809. Rondelet, *La coupole de la Halle au blé*, 4to., 1848. Delespine, *Marché des Blancs Manteaux*, fol., 1827. Baltard et Callet, *Halles Centrales*, fol., 1863-4.

Lebas, *L'obélisque de Luxor*, 4to., 1810; 1839. Laborde, *Descr. des Obélisques de Louxor, etc.*, 8vo., 1834. Baltard, *La colonne de la place Vendôme*, fol., 1810. Tardieu, *La Colonne d'Austerlitz sur la place Vendôme*, 4to., 1822; 1837. Duc, *Inauguration de la Colonne de Juillet* 1830. Lafolie, *Statue de Henri IV*, 8vo., 1819. Mariette, *Descr. des Travaux, etc., la fonte en bronze—de la statue de Louis XV*, fol., 1768.

Normand, *Arc de Triomphe des Tuileries érigé* 1806, fol., 1830. Brès, Ditto, fol., 1828. Lafitte, *Arc de triomphe de l'Etoile*, 4to., 1810; 1813. Thierry, Ditto, fol., Paris, 1845.

Anon., *Descr. du pont en fer coulé—en face du jardin du roi*, 4to., 1814. Anon., *Descr. du pont d'Austerlitz*, 4to., Rouen, 1814. Lamande, *Pont de l'école militaire*, 4to., 1814. Polonceau, *Notice sur—ponts en fonte, suivi le pont du Carrousel*, fol. and 4to., 1839.

Vaudoyer, *Château de Madrid en le bois de Boulogne*, 4to., 1839. Mansart, *Hôtel de Clugny*, fol., 1680. Du Sommerard, *Notices sur l'hôtel de Cluny et sur le palais des Thermes, etc.*, 8vo., 1834. Armand, *Plans, etc., du Grand Hôtel construit en* 1861-2, fol. Marchand et Fournier, *Histoire des Hôtelleries, Cabarets, hôtel garnis, et des anciennes confreries et communautés d'hôtelliers, etc.*, 2 vols., 35 pl., 8vo., 1851.

Hittorff, *Rotonde des Panoramas*, fol., 1842. Expositions of 1834, 1849, 1855, 1862, 1867. Anon., *Les douze Expositions de l'Industrie en France de* 1798 *à* 1855, 16mo., 1858. Magne, *Théâtre du Vaudeville*, fol., 1871. Davioud, *Les Théâtres Impérial du Châtelet, et du Lyrique*, fol., 1871. Mitter, *Le Nouvel Opéra*, 63 engr., 12mo., 1875. Garnier, *Le Nouvel Opéra*, fol., 1877, in progress.

List No. 6.—Architectural Publications.

Archives *de la Commission des Monuments Historiques*, lar. fol., 1856 (in progress). Marot, *L'Architecture Française*, 4to., 1650; 1713; fol., 1727-51; 1764. Marot, *Recueil des plans, etc., des Palais de Paris*, or *Petit Œuvre d'Arch.*, fol., 1670; 1674; 1727. Blondel, *Architecture Française*, fol., 1752-56. Bruyère, *Etudes relatives à l'art des Constructions*, fol., 1823-28. Gourlier, Biet, Grillon, et Tardieu, *Choix d'Edifices publiques*, 3 vols., fol., 1826-38. Viollet-le-Duc, *Dictionnaire d'Architecture*, 8vo., 1854-68, Index.

Krafft, *Recueil d'Architecture Civile; plans, etc., des châteaux, etc., et habitations rurale à Paris et ses environs*, fol., 1812. Krafft et Ransonnette, *Plans, etc., des plus belles Maisons et des Hôtels construits à P.*, etc., fol., 1801. Krafft, *Maisons et Portes Cochères*, fol., 1838-40. Thiollet et Le Roux, *Menuiserie*, etc., fol., 1825. Leveil et Leblan, *Maisons modernes*, fol., 1858. Duval, *Petites Maisons de Plaisance choisies aux environs de P.*, 30 pl., fol., 1843. Durand, *Vues des prirés Bâtimens de P.*, 44 pl., 4to. (1789 ?). Thiollet, *Choix de Maisons, Edifices, et Monts. Publics de Paris et ses environs*, fol., 1838. Normand, *Paris Moderne*, 480 pl., 3 vols., 4to., 1837-38-45; Liège, 1843-46-48. Calliat, *Parallèle des Maisons de Paris construits depuis* 1830 *jusqu'à nos jours*, fol., 1851-60. Ditto, *Nouvelle période de* 1850 *à* 1860, fol., 1860-64. Daly, *L'Architecture Privée au XIXe siècle*, 3 vols., fol., 1860-4. Second Series, 3 vols., fol., 1872; and *Décorations Intérieures*

Peintes, 2 vols., fol., 1874-77. Anon., *Maisons les plus remarquables de Paris construites pendant les trois dernières années*, 80 pl., par Pigeory, Fleury, Lenoir, Blondel, Davioud, Labrouste, etc., fol., 1870.

Donnet, *Architectonigraphie des Théâtres de P.*, 8vo., 1821. Donnet et Kaufmann, *Architectonographie des Théâtres de P.*, 8vo., 1837. Dumont, *Les Salles*, etc., fol., 1763-66.

Grantham, *Hist. of the Abattoirs of P.*, 8vo., Lond., 1850. Emmery, *Statistique des égouts, année* 1836, 8vo., 1837. Girard, *Recherches sur les eaux publiques de P.*, 4to., 1812. Courlier, *Des voies publiques et des Habitations particulières de P.*, 8vo., 1853. Lorieux, *Atlas souterrain de la V. de P.*, 1855. Palaizzeau, *La ceinture de Paris, les Barrières.*

Tenon, *Mémoires sur les Hôpitaux de P.*, 4to., 1788. Anon., *Plans des Hôpitaux et Hospices Civiles de P.*, 29 pl., 4to., 1820. Husson, *Etude sur les Hôpitaux, considérés sous le rapport de leur constructions, etc.*, 4to., 1863. Raspail, *Les Prisons de P.*, 8vo., 1839. Alhoy et Lurine, *Prisons de P.*, 8vo., 1846.

Moisy et Duval, *Fontaines de P.*, fol., 1812. Visconti, *Fontaines Monumentales à P.*, etc., fol., 1860. Alphand et Davioud, *Les Promenades de Paris; Le Bois de Boulogne Architectorale*, fol., 1860: 1870-74. Vacquer, *Bois de Boulogne architectorale*, fol., 1863. Robinson, *Parks, Promenades, and Gardens of Paris*, etc., fol., 1869. Duvillers, *Les Parcs et Jardins*, fol., 1871. Durdent, *Descr. des Vues pitt. des Jardins publics*, 4to., 1812-3.

List No. 7.—Magazines and Journals.

Moniteur des Architectes, 4to., 1847-65; new series, 1866, etc., gives 1853, p. 119, a chronological table of the principal churches. Encyclopédie d'Architecture, edited by Calliat et Lance, 4to., 1851-62; continued as Gazette *des Architectes et du Bâtiment*, 1863-71; and now Encyclopédie d'Arch., 2nd series, 1871-77. Daly, *Revue Générale*, etc., 33 vols., 4to., Paris, 1840-76. Oppermann, *Nouvelles Annales de la Construction*, fol., 1855-66. Forster, *Allgemeine Bauzeitung*, fol., Vienna, 1835-76, illustrates many of the edifices in Paris.

Abattoir (*Illustrations*). Amphitheatre. Aqueduct (*Illust.*). Barrier (*Illust.*). Bridge. Fountain (*Illust.*). French architecture. Granary (*Illust.*). Hospital (*Illust.*). Market. Mausoleum. Memorial column. Merchants' hall. Observatory. Theatre. Triforium (*Illust.*). Versailles, etc. 14. 28. 50. 96.

PARIS (Jean de), see Perreal (Jean).

PARIS (Maignaud of); see Mignard.

PARIS (Pierre Adrien), born 1747 it is usually stated, but probably 1745, at Besançon, studied under his father, who was *intendant* of the buildings to the bishop of Bâle, and finished his studies under Trouard, architect to the king. Having passed through the école royale de l'architecture, he carried off the third *grand prix* in the years 1768 and 1769; went to Rome in 1772, and there studied numismatics, archæology, and the monuments of architecture. On his return to France he became known by his drawings, which were engraved for Laborde, *Tableaux, etc., de la Saisse*, fol., Paris, 1780-86, and Saint Non, *Voyage à Naples et de la Sicile*, fol., Paris, 1781-86. Between 1775-77 he built the hôtel of the marquis Chastenoix in the rue S. Honoré at Paris, and the depôt de la mendicité at Bourges: and made a design for a palace for the prince bishop of Bâle. In 1778 Paris was appointed dessinateur ordinaire du cabinet du roi, and a short time afterwards succeeded Soufflot at the academy of architecture. Appointed architect des économats, he was charged with the decorations for the fêtes at Versailles, the Trianon, and Marly. During a second journey 1783 to Italy he was chosen architect of the opera to direct the decorations. In 1786, with Bernard, he designed a windmill to raise water in the garden of — Beaugeon, afterwards Vanterberghe, faubourg du Roule: it is given in Krafft, *Maisons—à Paris*, fol., Paris, (1802), pl. 47. From 1787-90 he added to the towers the third story or colonnades designed by Trouard, at the cathedral of Orleans, and some works to the *portail*. He made designs for the hôtel de ville at Neufchâtel, and a hospital at Bourg, which were alt red without his sanction. In 1787 the hôtel des Menus Plaisirs at Versailles being required for the reception of the Assemblée des Notables (Etats Généraux), Paris was ordered to decorate and arrange for this purpose (5 May 1789) a large new building which had been used as a storehouse. The details of the roof, 78 Fr. ft. wide, are given in Krafft, *Charpente*, fol., Paris, 1805, pt. 2, pl. 33, p. 13: there is a large interior view engraved by Helman from a painting by C. Monnet. In 1788 Louis XVI appointed him chevalier de S. Michel. The national assembly ordered him to make the famous iron safe (*armoire*) intended at first to contain the machinery used in making assignats, but which later on contained the constitution, and is still preserved in the Archives Nationales. On the death of Louis XVI, Paris retired to the château Colmoulin near Havre, where he designed an expiatory monument to the king. In 1795 he was nominated member (non-resident) of the académie des beaux arts in the Institut. In 1806 he went again to Italy, and at Rome, by the persuasion of friends, accepted the post of director of the Academy of France on condition that no oath should be required from him, and that his salary (*traitement*) should be employed for the benefit of the pensionnaires. About the same time he was commissioned by the French government to purchase the antiquities at the Villa Borghese, for the Louvre. He was elected a member of the academy of S. Luke at Rome. In 1811 he undertook to direct the excavations at the Colosseum, and to make exact plans of that monument; and contributed drawings to Seroux d'Agincourt, *Histoire de l'Art par ses monumens*, fol., Paris, (1811)-23. He left Rome in 1817, returning to Besançon, where he died 1st August 1819, "aged 75 years" according to a register: and bequeathed to his native town his collection of antiquities, drawings, books, etc., which now form a museum. During the last few years of his life he finished a manuscript on the ancient buildings of Italy, on which he had worked for nearly twenty years. He also left in manuscript *Recueil de dessins et études d'architecture de Paris*, 9 vols., fol.; *Examen des édifices—de Rome*, fol.; and *Restauration du Colisée*, consisting of 45 folio drawings with descriptions, of which a copy is said to be in the library at Paris, another in the library at Besançon; and a third is in the British museum, Addit. MS. 17,000, purchased of M Clerget, 3 July, 1847. These important drawings, signed by Paris, show the "souterrain singulier et inconnu", discovered during the excavations made by the French Government during 1811-12-13. He maintains that this building only held 44,000 persons instead of the exaggerated number of 80,000 usually stated. Re and Bianchi, *Osservazione sull' Arena*, fol., Rome, 1812, detail some of these excavations. C. Guttenberg, Bertault, and others, have engraved his drawings of antiquities at Herculaneum, Pompeii, etc. He also made translations of some English works upon Agriculture. Fontaine and Percier were pupils of Paris (sometimes said of Peyre the younger).

De Buzonnière, *Le Catalogue raisonné du Cabinet de Paris*, printed 8vo., Besançon, 1821, has a memoir prefixed. Leroi, *Rues de Versailles;* Bordier, *Les archives de la France.*

68. 110. 112. 113.

PARIS BLUE. A name used on the Continent for a very intense Prussian blue, a precipitate from the peroxide of iron. It shows when rubbed a copper-red lustre, in the same way that does indigo. Fairholt, *Dict. of Terms*, 8vo., (1870). The name appears also to have been given to a deep cobalt blue.

PARISH (Gr. *paroikia;* Span. *parroquia*). Furley, *Weald of Kent*, 8vo., Lond., 1875, ii, has suggested that the probable etymology of this word is *preostscyre*, which signifies the precinct of which one priest had the care, or in English priestshire (Lat. *parochia*, Fr. *paroisse*). In England, it is a district assigned to a church either from time immemorial or by act of parliament: some very large ones contain one or more "chapels of ease", which lately have, under an act of parliament, become "district

churches". There are about 10,700 parishes in England and Wales, and nearly 2,500 in Ireland. They were first distinguished in England under Honorius, archbishop of Canterbury, about 636; CAMDEN, *Britannia*, edit. 1695, clxix. Baptism in rivers and fountains was given up in course of time for a font placed in a house, then near the church, in the church porch, and finally in the cathedral church where the bishop resided. This, when too far from some villages, he transferred the right of baptism and sepulture to the rural churches; and this, together with the right of tithes, made it a parish church of the kind that now exists. A multitude of persons, of two or more villages together, having got liberty for baptism and burial, with consecration thereof by the bishop, and sometimes an allowance in money or tithes from the mother church, became "parochial chapels", having all the rites and ceremonies as the mother church or parish church hath, except the tithes; so that they are lesser parishes created within the greater, for the benefit of the neighbourhood; ASTLE, *Origin of Parishes, Parochial Chapels, etc.*, in ANTIQUARIAN REPERTORY, 4to., Lond., 1808, ii, 423. PRIDEAUX, *Churchwarden's Guide.*

BURTON, *Mon. Ebor.*, fol., York, 1758, states, p. 15, that Theodore, who came over 669, when he made his first general visitation of all the English dioceses, observed certain defects, and set himself to redress the evils by the constitution of parishes, to which he allotted certain districts, generally of the same extent as the founder's estate.—As the number of people increased—other churches were erected—especially as the whole body used to communicate weekly at the Lord's table.—The division of manors and the alienation of land led to other churches, or chapels of ease, first called oratories, being erected. The mother church still enjoyed the sole right of baptisms and burials and all the tithes and possessions she originally enjoyed. "Upon many of the manors in Scotland existed old churches placed there as early as Christianity itself. On some few of them remained also the family, or small convent, of religious, originally founded and endowed for their service. As yet, it would seem, were no tithes paid in Scotland, certainly no appropriation of ecclesiastical dues to any particular church. But through all Christendom the church was then zealously inculcating the duty of giving tithes to the secular clergy. The new settlers in Scotland were of the progressive party, friends to civilisation and the Church. They had found churches on their manors, or, if not already there, had erected them. To each of these manorial churches the lord of the manor now made a grant of the tithes of his estate; his right to do so does not seem to have been questioned; and forthwith the manor, tithed to its church, became what we now call a parish."—"Thus constituted, the parish often still further followed the fortunes of its parent manor. When a large manor was subsequently split into several lordships, it often became desirable that each should have a separate church."—"Sometimes a burgh grew up in the midst of a great ancient parish, and required a separate church and cemetery and independent parochial rights.—In such cases the rights of the mother church were first to be considered. By a transaction with the incumbent and the patron, sanctioned by the Ordinary, these might be acquired. But in many cases the new church was endowed separately, and the whole tithes, oblations, and dues of every sort which at first belonged to the mother church were reserved to her. In her alone was the right of baptism, of marriage, and of burial, and if the act was performed elsewhere, to her still belonged the valuable dues attending it." INNES, *Sketches of Early Scotch History*, 8vo., Edinb., 1861, p. 11; 13; 15.

The promoters of *Church extension* can proceed either under the "New Parishes Act", or under the "Church Building Acts", which are still in force. But it is only under the former act that a district can be assigned previously to the consecration of a church: and under it, one half of the pews and sittings must not only be free, but "as advantageously situated as the others".

Under 58th George III, c. 45, sec. 16, the ecclesiastical commissioners, with the consent of the bishop and patron, may divide a parish into two or more separate and distinct parishes, and apportion the rent charge, glebe, and other emoluments between the old parish and the new parish or parishes. The new parish has a separate vestry, but the inhabitants remain liable during twenty years to contribute towards repairing the original parish church as well as their own.

Under sec. 21, the ecclesiastical commissioners may form district parishes which differ from distinct parishes, in that the endowments are not divided, and the incumbents are styled "perpetual curates".

Under 59th Geo. III, cap. 134, sec. 16, and subsequent "Church Building Acts", the commissioners may assign a chapelry district to any consecrated church or chapel. This is the most common form of ecclesiastical district.

Under 8th and 9th Vict., cap. 70, sec. 9, a consolidated chapelry district may be formed by the commissioners out of two or more contiguous parishes or districts.

Under the "New Parishes Act", the ecclesiastical commissioners may form into a separate district a part of any parish or parishes, whether there is (19th and 20th Vic., cap 104, sec. 1) or is not (6th and 7th Vict., cap 37, sec. 9) a church or chapel within its limits. CHURCH BUILDER *Journal*, 1865, p. 176. PHILLIMORE'S edit. of BURN, *Ecclesiastical Law*, art. Church Extension. HODGSON, *Instruction for the Clergy.* DALE, *Clergyman's Legal Handbook.* PRIDEAUX, *Churchwarden's Guide.*

PARISH CHURCH. The church, or chief church, in a parish. A parish church is all one, the nave and chancel being only different divisions of the same apartment. The *canons* made it two, as they wanted the choir for their own services, so they fenced it off by screens in a way which takes from it all ritual resemblance to the parish chancel. Against the western or rood screen was placed an altar, called the Jesus altar, or altar of S. Cross, for the use of the public, and when such a church was partly parochial, this was the parish altar; as at Bolton in Yorkshire, where is also the piscina and a plain stone bench serving for the sedilia: Howdon and Bridlington are other examples, proving how the parish church has saved the nave when the choirs have gone to ruin. CHANCEL.

In Belgium, in the ordinary constitution of a parish church, the government pays a stipend to a certain number of priests appointed to each church; the parishioners elect four churchwardens, who form a council with the curé, who has two votes in any division. S. Paul's church at Antwerp had a dean paid by the State and three priests; eight other ecclesiastics were paid by collections and by the money raised by the letting out of chairs, etc.; WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 17.

BOWMAN and CROWTHER, *Churches of the Middle Ages*, fol., Lond., 1845-53. BUCKLER, *Churches of Essex*, 8vo., Lond., 1856. GLYNNE, *Churches of Kent*, 8vo, Lond., 1877. FERGUSSON, *Hist. of Arch.*, 8vo., Lond., 1867, ii, 59-63. MICKLETHWAITE, *Modern Parish Churches, their plan, design, and furniture*, 8vo., Lond., 1874. MICKLETHWAITE, *Arrangements of an English Parish Church, to meet the requirements of the Nineteenth Century*, read at Architectural Association, abridged in BUILDING NEWS *Journal*, 1869, xvi, 179. WALCOTT, *Church and Conventual Arrangement*, read at Inst. of Brit. Archts., 1860-61: BUILDER *Journal*, xviii, 780, and xix, 5. DYKES, *History of Church Arrangement*, read at Yorkshire Arch. Society, and printed in ASSOCIATED SOCIETIES, *Reports and Papers*, 1852, ii, 60-72. CORNER, *Rural Churches; their Histories, Architecture, and Antiquities*, fol., Lond., n. d. GAGE, *Anglo-Saxon Ceremonial of the dedication, etc., of Churches*, fol., Lond., 1834. TRIMEN, *Church and Chapel Architecture*, 8vo., Lond., 1849. TRUEFITT, *Designs for Country Churches*, fol., Lond., 1850. POTTER, *Specimens of Ancient Ecclesiastical Architecture*, fol., Lond., 1848. *Working Drawings of Churches*, by Atkinson, Ebbells, Goodwin, etc., 4to., Lond., n. d. *Churches of Yorkshire,*

8vo., Lond., 1842-5. *Churches of Archdeaconry of Northampton*, etc., 8vo., Lond., 1849. *Churches of Cambridgeshire and Isle of Ely*, 8vo., Oxford, 1845. WILSON, *Churches in the Archdeaconry of Lindisfarne*, 8vo., Newcastle-on-Tyne, 1870. FRASER, *Parish Kirks and Manses in Scotland*, 4to.,

BAUDOT, *Eglises de Bourgs et Villages*, 4to., Paris, 1867. *Eglises, Châteaux, etc., de la Picardie et de l'Artois*, 8vo., Amiens, 1849.

BUILDER; BUILDING NEWS; CIVIL ENGINEER'S, ETC.; and ARCHITECT; Journals. Other papers quoted s. v. CHURCH.

PARK (It. *parco;* Span. *parque;* Fr. *parc;* Ger. *park*). As originally applied in English, this word meant a large forest enclosed with a wall or paling, and stored with beasts of chase, etc., which may be possessed either by prescription, or the grant of the sovereign. These are usually royal demesnes. Woodstock was the first park in England according to CAMDEN: and it is said a park was first walled in England not many years before Chaucer's time (1328-1400). "Wee had no parkes left at the comming of the Normans", writes HARRISON, in HOLINSHED, *Chronicles*, fol., Lond., 1587, p. 15, "neither was any parke supposed in these times to be statelie enough, that contained not at least eight or ten hidelands, that is, so manie hundred acres or families (or as they have been alwaies called in some places of the realme, carrucats or cartwares), of which one was sufficient in old time to maintaine an honest yeoman." Speaking of the increase of parks in his time, he says—"the twentieth part of the realme is imploied upon deere and conies alreadie". Andrew BORDE, who wrote in the reign of Henry VIII, said there "were then more parks in England than in all Europe besides", over which he is reported to have travelled. The old patent rolls are full of licenses for emparkations, which do not now exist. The king's warrant was as necessary to surround a park with palings or walls as it was to embattle the mansion.

In its more general acceptation, the term park implies a considerable extent of enclosed ground, and attached to the residence of a person of rank or position. The picturesque arrangement of such land comes within the province of the landscape gardener. "Wherever a park is extensive, or where the ground is irregular and the character of a park is intended to be given, wildness appears to me one of its greatest beauties. Tame parks, consisting of wood, lawn, and naked water, abound everywhere; but such as have a forest and original park appearance, are only found in those happy spots where nature is untouched, where time has triumphed over tasteless art, or where the rage of art for smoothness and unbroken verdure is continually counteracted by a vigorous vegetation. Some such places actually exist from these causes, at Dalkeith, Hamilton, and Dunkeld; and some by the efforts of art and genuine taste, at Foxley, Downton, and Yoxal Lodge. The forest of Needwood —exhibits an example both of wildness and utility—." Two sorts of parks are described;—1, of a small residence; and 2, where grandeur of character is the chief object, in LOUDON, *Country Residences*, 4to., Lond., 1806, ii, 379; 430-3. 6.

In REPTON, *Landscape Gardening*, edit. by LOUDON, 8vo., Lond., 1840, 208, it is stated, "The chief beauty of a park consists in uniform verdure; undulating lines contrasting with each other in variety of forms; trees so grouped as to produce light and shade to display the varied surface of the ground; and an undivided range of pasture. The animals fed in such a park appear free from confinement, at liberty to collect their food from the rich herbage of the valley, and to range uncontrolled to the drier soil of the hills." REPTON, *Sketches and Hints*, 4to., 1795 (p. 78 of the above edit.), refers to the parks at Welbeck, Wembly, and Castle Hill.

LANDSCAPE GARDENING; ORNAMENTAL GARDENING; both of which articles comprise a list of publications, many describing parks. GROHMANN, *Ideen-Magazin; Recueil—pour la décoration des Jardins et des Parcs*, 4 vols., 450 pl., fol., Leipzig, 1797-1802. ANON., *Descr. des principaux Parcs et Jardins de l'Europe*, 3 vols., fol., Vienna, 1812. KIP, *Britannia Illustrata*, 4 vols., 312 pl., fol., Lond., 1697-1715. DIESEL, *Jardins et Maisons d'Allemagne et Bavarie*, fol., Saltzburg, (*cir.* 1720). ROBINSON, *Parks, Gardens, etc., of Paris*, fol., Lond., 1869. DUVILLERS, *Les Parcs et Jardins*, fol., Paris, 1871.

The word "park" is also now applied to the instances wherein the piece of land is laid out for the recreation and healthy exercise of the public. The first instance was probably 1823 that of Marylebone, afterwards called Regent's, Park, London.

	Acres.		Acres.
LONDON.—All parks in and near it, including gardens, squares, & parade grounds	6,000	BIRKENHEAD, near Liverpool	180
,, Hyde Park - 387	380	DUBLIN, Phœnix, about	2,160
,, Kensington - 290	227	PARIS, Bois de Boulogne	2,158
,, St. James's - 83	87	VERSAILLES, gardens, about	3,000
,, Green - 71	56	BERLIN, Thiergarten, about	200
,, Regent's - 403	372	MUNICH, Englischergarten, about	500
,, Victoria - 160		VIENNA, Prater	1,500
,, Greenwich - 174		MAGDEBURG	120
WINDSOR, Great	3,500	NEW YORK, Central	626
,, Little	300		
RICHMOND	2,250		
MANCHESTER.—Three public parks, 44 acres, and Peel Park 37 acres.			

BUILDER *Journal*, 1860, xviii, 698; in *Report* of the commissioners on the Central Park. ARCHITECT *Journal*, 1850, ii, 336.

Articles on "Parks" as public recreation grounds, are printed in BUILDER *Journal*, vols. xxii, 1864; xxiv; xxvii; xxxiii: and BUILDING NEWS *Journal*, 1865, xii; xiii; xix; xx; xxi; xxiv-vi; xxxi. The descriptions of *Gardens, Parks*, etc., in *Pictorial Handbook of London*, 8vo. (Weale), 1851; and Bohn's Illustrated Library, 1854; p. 450-(540).

PARKE (HENRY), son of Mr. Parke, the eminent hautboy player, who flourished in the beginning of the present century. Henry was originally intended for the bar, and studied under a special pleader for the usual period; but a certain stuttering and indistinct utterance of speech impelled him to forego the hope of success at the bar, and he gave it up. However, he was of rather a discursive disposition, and somewhat inconstant in his pursuits, and had no sooner overcome the difficulties of one class of study, than he took up another. At length a passion for architecture possessed him, and his father placed him with Sir John Soane, then architect to the bank of England and professor of architecture at the royal academy: some of his finest drawings exhibited at the lectures were by Parke. He became well versed in mathematics, geometry, mechanics, and drawing, both architectural and landscape, his mind grasping every detail with the most minute accuracy. He went abroad about 1820-24, and visited Italy, Sicily, Greece, and Egypt, ascending the Nile in 1824 with a fellow-student, J. J. Scoles, and with him tracing its course, publishing 1829 *Map of Nubia, comprising the Country between the first and second Cataracts of the Nile*, and on it, a plan of the Island of Philæ with its several monuments. This is a very valuable map, as it indicates the positions of all the temples, rock-cut tombs, and other buildings, on the banks of the river. At Rome, he worked with Catherwood, Donaldson, and other young fellow-students, measuring laboriously the several remains. On returning to England, he worked out his several sketches, and made numerous beautiful drawings and views of buildings and ruins, between five and six hundred of which were presented to the Royal Institute of British Architects by his widow, and form a valuable collection (*Report*, 1836, xxviii). The Institute also possesses a sketch by him of a sextant capable of taking an angle 18° (dated 1826); and another of an instrument to measure angles, internal and external, for purposes of taking architectural plans, dated 1833. An "interior of a sepulchral chamber" 1830, and "Temples in the island of Philæ" 1831, were exhibited at the royal academy of arts. He built a house in Queen square, Westminster, facing on S. James's Park, and died 5 May 1835 (believed to have been in his 43rd or 45th

year), leaving among his friends and brother architects the reputation of a most able artist and man of science, amiable in disposition and high-minded in all the relations of life. The memoir in the GENTLEMAN'S MAGAZINE, new series, iv, 325, 670, states that to him was chiefly confided the composition of the medal, presented by some architects of Great Britain to Sir John Soane, the use of the die of which is allowed annually to the Roy. Inst. of Brit. Architects for its Soane medallion prize. Many of his works were sold by auction at Sotheby's in May 1836. T. L. D.

PARKE (ROBERT, sometimes called EDWARD), also written Park, Parks, and Sparks. He designed Aug. 1787—Oct. 1794 the west façade with the Ionic colonnade 147 ft. long, as additions to the house of commons, now bank of Ireland, in Dublin, at a cost of £25,396. In MULVANY, *Life of Gandon*, 8vo., Dubl., 1846, p. 116, it is claimed that this front was executed from a design by Gandon, who had done the east additions previously. He designed 1796-9, the commercial buildings, of granite, cost £37,000. The ultimate conversion of the senate house into the bank of Ireland 1804 was conducted by R. Parke, upon the design of Francis Johnston; (MULVANY, 144). In 1806 he designed the royal college of surgeons, at a cost of £40,000 (redecorated, etc., 1825 by W. Murray); and *cir.* 1816, the infirmary and dwelling to the Hibernian marine school, at a cost of over £6,000. WHITELAW and WALSH, *Hist. of Dublin*, 4to., Dubl., 1808, i, 234; 529; 531; 615; 987. The date of his death has not been ascertained.

PARKER'S CEMENT, also called SHEPPEY, and ROMAN, CEMENT. "In 1796 James Parker, of Northfleet, took out a patent for making certain cements, to be used in hydraulic or other buildings, and for stucco work. He describes his cement as being obtained from certain stones, or argillaceous productions, or nodules of clay. This stone was termed Sheppey cement, from being found near that island. The stones were burnt in kilns, and afterwards ground to powder, which was found to possess the peculiar property of hardening under water. Mr. Parker denominated it "Roman cement", and under this name it was almost universally used for constructions under water, to the exclusion of many of the best English hydraulic cements, such as Aberthaw, Halling, Dorking, and other places. —The properties of these cements have since been eclipsed by the PORTLAND CEMENT of Messrs. Bazley White, and Co." INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1856-7, xvi, 433. ROMAN CEMENT.

PARKE WORK. A kind of tapestry, exhibiting rude figures of deer and wild beasts, and was of wool only. It was first manufactured and imported from Arras in Flanders, whence it received the name of "Arras". ARRAS HANGINGS.

PARKINSON (JOSEPH), born 1783, was articled to W. Pilkington of Whitehall Yard; and became secretary to the Emigrant office for French refugees, during its existence. His father, James, solicitor, having gained the Leverian museum in a lottery, James Burton designed 1786 the building for it (afterwards the Surrey institution), in the Blackfriars road, and in 1809 Joseph added the library. In 1811 he laid out Bryanston square; and was appointed about that time surveyor to the Union Fire Assurance office; he resigned about 1853. About 1822 he made "a magnificent design" in the Roman style, for either an addition or alteration to Magdalen college, Oxford; it was not carried out, but 1822-30 he rebuilt, in the Gothic style, the north side of the old quadrangle with the exception of the narrow passage at the west end and the exterior wall of the cloister as high as the string course; the east side was also rebuilt except the walls of the cloister and the windows over it in the interior of the quadrangle; the south cloister and the story over the north cloister were rebuilt after the model of the former ones; with other works; and the library increased in length (it was refitted *cir.* 1830); (BUCKLER, *Observations on S. Mary Mag., etc.*, 8vo., Lond., 1823, p. 138; 140: INGRAM, *Memorials*, 4to., Oxford, 1837). He designed several private houses, including a large mansion at Great Stanmore for Mr. Windle, costing £12,000; was employed by the duke of Buckingham and Chandos in the Isle of Wight; and rebuilt the body of Streatham church, Surrey, since greatly enlarged. Among his pupils were John Haies, afterwards on the stock exchange; Joseph Jennings, F.R.I.B.A.; the late Raphael Brandon, F.R.I.B.A.; professor T. Hayter Lewis, F.S.A.; and his nephew Fredk. C. J. Parkinson. He died May 1855, and was buried at Kensal Green.

PARKNOOK QUARRY. There are two quarries of this name in Yorkshire, one at Doncaster, and the other at Robin Hood's well, Norton. The former is of the magnesian limestone formation; the latter a freestone obtained from the coal measures; this stone has been used in Robin Hood's well, Pontefract old church, Askern spa, etc.

PARK SPRING QUARRIES. These are situated at a place so called, near Leeds, in Yorkshire, and consist of the old quarry, and one or two new ones, all in the same field; the stone from these does not differ materially in quality. It is composed of a fine grained quartzose sand and decomposed felspar, with an argillo-siliceous cement, and numerous flakes of mica in the planes of stratification: its colour is a light ferruginous brown caused by the oxide of the silicate of iron. The weight varies from about 131 to 151 lbs. per foot cubic, and the crushing weight is nearly that of Craigleith stone. Stones 10 to 12 ft. in length are obtained, and the thickest beds are 2 ft. 4 ins.

This stone was used in the construction of S. George's hall at Bradford; and the Commercial Buildings (now pulled down) at Leeds, the only public building in that town in which the stone has been at all largely used; it did not prove durable, having crumbled much in the soffits of external entablatures and other parts not exposed alike and equally to wind and to wet. Yet compared to some building stones, that of Park Spring is very durable. It has now been superseded by that from Harehill quarry. Park Spring stone is obtained in blocks, and is also sawn into slabs 1, 1½, 2, 2½, 3, 3½, and 4 ins. thick, and into landings, 3, 4, 5, 6, and 7 ins. thick. Steps are cut out of it. Commissioner's *Report* on Building Stones. HUNT, *Memoirs* of the Geological Survey, 8vo., Lond., 1860. YORKSHIRE STONE.

PARK QUARRY. This quarry is situated at New Malton, Yorkshire; it is a sandstone of the oolite formation; and used in buildings, especially in churches of the locality; and for landings, steps, etc.

PARKYN (JAMES and THOMAS), masons of Worsborough, Yorkshire, covenanted 1567 to "make or cause to be made to the use of (Henry Everyngham of Staynburgh) as moche as dothe belonge to the science of mason", two large plain windows with mullions as further described, the stone to be got from the late monastery of Burton Graunge, formerly Bretton priory; the contract is given in HUNTER, *South Yorkshire*, fol., Lond., 1828-31, ii, 278.

PARKYNS (SIR THOMAS), second bart., was educated at Westminster school, at Trinity college, and the inns of court. He had a perfect knowledge of mathematics, especially of architecture and hydraulics, contriving and drawing all his plans without an architect. Being come of age at his father's death, 15 July, 1684, he first new roofed the chancel at Bunny, Northamptonshire, 58 ft. long and 24 ft. wide inside; built the free school and four almshouses, which cost £400; the vicarage house; the manor houses at Bunny; East Leak; and Highfield Grange, a very large house in the parish of Cortlingstock. He built a park wall of brick three miles long in three years, in the liberty of Bunny, all on arches, being the first that was built in England after that method, and since followed by most eminent builders of houses and park walls, but especially gardeners, for the advantage of trees shooting and spreading their roots under the said arches, etc. He built all the farm-houses, etc., in Bunny and Bradmore. He wrote his queries and reasons why the

county hall for Notts should be built on county ground which he purchased for the purpose, and not in the market place of the town—and thereby prevented their spoiling the fine prospect of that large and spacious market place. He died March 1740-1, and was buried in a vault erected by himself at the east end of the chancel of Bunny church. BETHAM, *Baronetage*, 4to., Lond., 1803, iii, 44.

PARLIAMENT HINGE. A projecting hinge used chiefly for outdoor purposes, so as to allow of a shutter folding back against a wall when open. They are in shape like ⊢ı⊣ the hinge being formed at the I. They are made of cast and wrought iron, from $3\frac{1}{2}$ to 5 ins., proceeding in size by half inches: also $2\frac{1}{2}$ in., the joint to rise when open 3 in.; $1\frac{3}{4}$ to rise $3\frac{1}{2}$; 2 to rise 4; $2\frac{1}{4}$ to rise $4\frac{1}{2}$; $2\frac{1}{2}$ to rise 5; and 3 to rise 6.

PARLIAMENT HOUSE. The place of assembly of the representatives of a people. Such an edifice has been noticed in the following places;—LONDON: MELBOURNE: and OTTAWA. At BERLIN, the design by Sir G. G. Scott, is given in BUILDER *Journal*, 1875, xxxiii, 774 and 820: and BUILDING NEWS *Journal*, competition 1872, xxii, p. 8, etc.: xxix, 166; 196; 224. At Cape Colony, the design by W. Freeman, B. N. *J.*, 1875, xxviii, 64; xxx, 385; 416-7. At Sydney, competition described 1861, CIVIL ENGINEER, *Journal*, xxiv, 221: and BUILDER *Journal*, xix, 508; 902.

PARLIVER (MEISTER CLAUS), between 1378 and 1386 was *baumeister* at the Petri Paulikirche at Leignitz. 92.

PARLOUR; PARLER; PARLOIR (Fr. *parloir;* It. and Span. *parlatorio*). The "speke house" of some old documents: a room for conversation in monasteries; it was the common or reception room where the monks gave directions to the servants, traded with merchants, or conversed with friends. It adjoined the gate or the refectory. It was placed on the east side of the cloister at Clairvaux; at S. Mary's abbey at York; Walsingham; and Beaulieu: on the north side at Clugny; on the south at Fountains, and Citeaux; south-east at Shrewsbury; west at Durham, Easby, and Thornton; and north-west at Newstead. FOSBROOKE, *Brit. Mon.*, ch. xli; DUCANGE, iv, 142; LENOIR, ii, 327; WALCOTT, *Church, etc., arrangement*, 1860. In some monasteries it was a small room adjoining the chapter house. At the burial of a monk at Durham monastery, after the body had been taken to the chapter house, it was carried "through the *parler*, a place for merchants to utter their wares, standing betwixt the chapter house and the church door, and so through the said *parler* into the Sentuarie garth where he was buried"; SURTEES SOCIETY, *Monts., Rites, etc.*, 8vo., Lond., 1842, p. 44. At the abbey of S. Germain des Prés at Paris, the abbé Gérard some years after 1266, and before 1368, built the new dormitory. Near it was the *parloir*, remarkable for the slightness of its construction; a single column of 3 in. French diam. sustained the vault, 33 ft. Fr. long and 29 ft. wide; TURPIN DE CRISSÉ, etc., *Souvenirs de Paris*, fol., Paris, 1836, p. 10. The Cistercians had three parlours; 1, for visitors; 2, for conversation; and 3, for confession: see LOCUTORIUM. CHAPTER HOUSE. SHARPE, *Architecture of the Cistercians*, "Domus conversorum", or day room and dormitory, 4to., Lond., 1874. 19. 22.

The parlour was also a room for conversation in a private dwelling. "The wealthy merchants of the metropolis, in constructing their mansions, not only built a hall but a parlour, and it is to the 14th cent. that the introduction of the latter apartment must be attributed": it is named in a lease made in 1354-5, as quoted by TURNER and PARKER, *Domestic Arch.*, 8vo., Oxford, 1853, ii, p. 183. In the inventory of the rooms and offices at Hengrave Hall, Suffolk, 1525-38, a summer parlour and a winter parlour are named: GAGE, *Hengrave*, 4to., Lond., 1822. LESCHE.

In more modern times the dining-room of a small house, where there is no morning room, becomes the parlour, or the parlour-dining-room; as described in KERR, *Gentleman's House*, 8vo., Lond., 1865.

PARMA (Augusta Julia Colonia of the Romans, being rebuilt by Julius Cæsar and Augustus). The capital of the former duchy of the same name in Central Italy, situated on the river or torrent Parma, which is crossed by three bridges, and a railway bridge. Near it, and over the river Taro is the magnificent bridge of 20 arches, 1922 ft. long (586 metres), designed 1821 by Cocconelli and Ferrari, which cost 2,161,508 fr. The town is surrounded by walls flanked with bastions, defended by a castle, the fortifications by San Gallo and San Michele; and is entered by five gates; the porta nuova (1765-1802) is by C. Bettoli. The Roman Via Æmilia traverses the town centrally from east to west, forming the High street, and others are parallel or cross it at right angles. There are four squares. It is the see of a bishop. The duomo, dedicated 1106 to the assumption of the Virgin, is in the form of a Latin cross, the crossing having an octagon tower with a domical roof, a rough section of which, showing the inner roof put up to secure Correggio's paintings (1519-30) from injury is given in C. H. WILSON, *Report on Fresco Painting*, etc., 1843; reprinted in CIVIL ENGINEER, ETC. *Journal*, vi, 392. The arrangement of the triforium is remarkable; and WOODS notices that "the vaulting of the nave is elliptical—unusual in a building of this era". The west front is almost unaltered; the lions to the doorway are as late as 1821. The subterranean church under the choir and tower is supported by 28 marble columns having varied capitals, and has chapels out of it. The building is 82 ft. wide and high inside, and 254 ft. long. The brick tower or campanile, of about the same date as the duomo, deserves notice. HOPE, *Hist. of Arch.*, 8vo., 1835, pl. xiv. OSTEN, *Bauwerke in der Lombardie*, fol., Darms. (1846), pl. 25-7; which pl. 28 gives the baptistery, one of the finest in Italy. It is supposed to date from 496 and to have been completed 1216 or 17; Antelami or Antelini, sculptor, worked upon it in 1178: the *Handbook* states that Benedetto Antelami designed and commenced it after 1196, apparently from the inscription on the lintel of a door (given in *Comité Historique*, ii, 57). It was not completed until as late as 1821. It is octagonal outside, with 16 sides inside; from the angles spring converging ribs that form a pointed vault. It is 55 ft. 9 in. diam. inside, and 90 ft. 6 ins. high: the outside is cased with red Verona marble. The font was made by Johannes Pallassonus in 1298 according to the inscription upon it. The stalls of inlaid woodwork are by Bernardino Canoccio in 1493. KNIGHT, *Ecclesiastical Architecture*, fol., Lond., 1844, ii. SEROUX D'AGINCOURT (Architecture), pl. lxiii. HOPE, *Hist. of Arch.*, pl. xii. DOOR (WOOD). *Illustrations*, s. v. Baptistery.

There are some 22 parish churches. La Madonna della Steccata, which is in the form of a Greek cross, with an apse at each arm, and smaller chapels at their angles, was begun about 1521-39 from the designs of F. Zaccagna, carried out by his son Giam. F.; and completed 1750. Many tombs of the dukes of Parma are placed in it. It has a good dome. A bracket to a pedestal for a statue is given in *Illustrations*, s. v. Bracket. S. Giovanni Evangelista, in the form of a Latin cross with a dome, is attributed to Bramante, but the interior appears to have been designed 1510 by G. F. Zaccagna, and the exterior 1607 by Simone Moschino of Orvieto: it was continued by G. Mazzola (93); and the detached campanile 1614 with the façade by G. B. Magnani (96). The Benedictine monastery with three cloisters was commenced 1510 by B. Ludedero of Torchiera (TIRABOSCHI, p. 34). S. Alessandro 1625 is by G. B. Magnani. The Benedictine nunnery of S. Ludovico contains the camera di S. Paulo painted about 1519 by Correggio; it is about 70 ft. cube, with a lobby; GRUNER, *Fresco Decorations*, fol., Lond., 1844, pl. 28: an adjoining chamber is painted by Parmigiano. Among other churches is that of S. Annunziata with its monastery; S. Pietro, XVII cent.; S. Sepolcro; S. Uldarico on the site of the Roman theatre; the façade *cir.* 1750-80 is by G. Ghidetti, who also designed the interior of S. Antonio abate; S. Vitale; S. Guiseppe; the oratorio della Trinità; S. Agostino, of which the façade 1784 is by A. Bettoli; and the cappella di Madonna degli Angeli, which has a very large dome.

The ducal or Farnese palace, also called La Pilotta, is a rambling pile with a modern façade begun 1597 for duke Ranuccio Farnese I. The grand staircase leads to the teatro Farnese, the largest in Italy, perhaps in Europe; it was designed 1618-28 by G. Aleotti (in about a year is also stated); it is wholly of timber. The design has been ascribed to Palladio; to Giam. Magnani; to Donino Ferrari, (RICHARDSON, *Studies of Ornamental Design*, fol., 1848-52, 2 pl.); and its completion to Beruini (MILIZIA). "ADDISON, in his remarks on several parts of Italy, says, 'It is so admirably contrived that from the very depth of the stage the lowest sound may be heard distinctly to the farthest part of the audience, as in a whispering place'. Dr. MOORE, *Travels in Italy*, observes "that a whisper is heard all over this immense house'." The inside of it is surrounded with columns forming two arcades similar to those of the town hall at Vicenza. "It is remarkable that PIETRO PAULO, in his plan", and DUMONT, *Salles*, etc., 1763-6, show "only 13 inter-columniations; SAUNDERS 15; PATTE 17"; as also does RICHARDSON; "consequently the lengths of the theatre in these plans differ—. The theatres at Vicenza and Bordeaux are also surrounded by columns in the same manner"; WARE, *Remarks on Theatres*, 8vo., Lond., 1809, p. 46; and WOOD, *Letters*, 4to., Lond., 1828, ii, 115, notices that the theatre, 300 ft. long, is "neither beautiful nor convenient, but very remarkable on account of the distinctness with which one hears even a low voice on the stage through every part; it is *all* of wood, and all the planks are disposed vertically, which is not consistent with the plan usually adopted for the distant propagation of sound." In 1840 it was in a very dilapidated condition; and is "preserved as a curiosity" (GWILT, *Encyc.*, 2948); it forms a link between the revived classic theatre and that of the modern form: the roof has been renewed. DONATO, *Desc. del Gran Teatro Farnesiano di P.*, 4to., Parma, 1817. The palace also includes the museum of antiquities, containing many articles dug up at Veleia near Piacenza; the ducal library, founded 1769, and said to contain 140,000 volumes; and the academy and gallery of the fine arts founded 1572. The palazzo del commune, 1627 by G. B. Magnani, and completed 1673, is incomplete; the lower part is used as a corn market; near it is a statue of Correggio erected 1872: the scuole superiori or university is for 400 pupils; the *colegio* of the Jesuits is ascribed to Alessi and to Barozzi: the ospetale grande or della misericordia for 500 patients (Doric), was modernised 1782 by — Feneulle; the lunatic asylum or central hospital of Pazzi; the public garden with the palazzo del giardino, built for duke Ottavio Farnese by Boscoli, but 1767 altered and enlarged by cav. Petitot; the public library 1770, with upwards of 83,400 volumes and 4,000 MSS.; the smaller theatre (perhaps replacing the one designed about 1710 by F. Galli Bibiena, and another 1759 by J. A. Morand), was designed 1822-9 by N. Bettoli, assisted by P. Toschi in the decorations; it is also said to be designed by L. Canonica and superintended by Bettoli; TOSCHI, *Nouveau teatro*, etc., 8 pl., fol., Parma, 1829. The casa Venturi, afterwards Pettorelli, is by — Feneulle.

In the environs is the large villa at Colorno, the residence of the former dukes of Parma, designed by F. G. Bibiena, with extensive gardens; another villa called casino dei Boschi, near Sala, which belonged to the duchess (1840). The fortress of Canossa can be reached from Parma.

Map No. 199 of the Society for the Diffusion of Useful Knowledge. ANON., *Feste celebrate in P.*, etc., fol., 1769. LENGLET DU FRESNOY, *Méthode*, 4to., 396; *Voyage dans le Milanais*, ii, 86, etc. ANGELI, *La historia della città*, Parma, 1591. AFFÒ, *Storia della città*, 4 vols., 4to., 1792-5. DONATI, *Nuova Descr. della città*, 8vo., Parma, 1824. CORTESI, *Saggi Geologici degli Stati di P. e Piacenza*, 4to., pl., 1819. BERTOLUZZI, *Pitture di Parma*, 1830. BERTOLUZZI, *Nuovissima Guida*. COMOLLI, *Projet d'une fontaine*, fol., 1818. TOSCHI and BETTOLI, *Principali monumenti innalzati dal* 1814-1823, fol., Parma, 1824. WILLIAMS, *Travels in Italy, etc.*, 8vo., Edinb., 1820, i, 55, 14. 28. 93. 96.

PARMENTIER (VICTOR MARIE JUSTIN), born 1831, became a pupil of Charles Laisné, was commissioned in 1866 by the prefect of the Seine to restore the hôtel Carnavalet, and to arrange it for proposed "Musée historique Parisien". He exhibited at the "salon" in 1864 a restitution of the château de Madrid, in the Bois de Boulogne, a work which he bequeathed to the future Carnavalet museum. He died 14 March 1870, at Neuilly, near Paris.

PARMIERS; see PAMIERS, in France.

PAROCHIAL ASSESSMENT. Paper in LIVERPOOL ARCHITECTURAL SOCIETY, *Transactions*, 1855. BUILDING NEWS *Journal*, 1869, p. 86; 1870, xviii, 317. INSTITUTION OF SURVEYORS, *Transactions*, 8vo., Lond., 1868-9, *et seq.*; *passim*.

PAROCHIAL CHAPEL. A chapel having the parochial rights of christening and burying, differing in nothing from a church, but in want of a rectory and endowment; a chapel of ease; BURN, edit. by Phillimore, 8vo., Lond., 1842, i, 295. It is probably a perpetual curacy; and is generally of old foundation, and suited to the then wants of a small district with few inhabitants. 1 & 2 Vict., c. 106, s. 124. A chapel endowed with lands, etc., through trustees, for maintenance of building, and stipend of priest or curate. CHAPEL. CHURCH. CURACY. PARISH CHURCH.

PARONI (GIO. BATTISTA), practised at Cremona, where he died 2nd August 1799, aged 72 years, and was buried in S. Facio. 57.

PAROS. An island, one of the Cyclades, in the Grecian Archipelago. Parecchia or Parœkia, a wretched place, occupies the site of the ancient town: this and Naussa with a very large harbour, are now the chief places: the former is the better of the two. The houses have marble doors and windows. In the walls of the mediæval castle are ancient fragments, some upwards of 12 ft. in length, said to be derived from a temple of Æsculapius, of which yet a few remains exist on an elevation near the town. North of the castle is a ruined church of Our Lady of the Cross, having a semicircular apse of white marble, the only perfect specimen of Hellenic architecture in Paros: other fragments remain. The church of Our Lady of the hundred gates deserves notice. 14. 50.

The marble quarries are about 5 miles distance from Parœkia, in mount Marpessa, as stated by VIRGIL, now Capresso. There are two entrances to the underground works, both wide and lofty at the commencement, and soon becoming very narrow. No vestiges remain of the ancient roads leading to them. These quarries were re-opened 1844 for the tomb of Napoleon I, at Paris. This Parian marble, the lychnite of the ancients, was the most highly valued by them for its mellow tint, but it had a tendency to turn yellow; Carrara marble does not turn. It is stated that the latter marble is of a finer structure and clearer white than the Parian, but at the same time less bright and splendid, harder to cut, and not capable of so glittering a polish. The true Parian has generally somewhat of a faint bluish tinge among the white, and often has blue veins in different parts of it. CLARAC, *Musée du Louvre*, 8vo., Paris, 1841, however, describes it as being "A milk white, sometimes greyish; opaque; its tissue of grains smaller or larger, which determines two or three varieties; it takes a fine polish; its contexture makes it harder to work than fine Carrara. A cubic foot weighs 196 lbs." A writer in BUILDER *Journal*, 1860, xviii, 236, notices that "the Parian may be regarded as a different material from any of the marbles found in Carrara: it is of coarse granular formation, likely to be durable in any atmosphere." The crystalline appearance of its surface produces an exquisite effect, and renders it superior for sculpture to all other white marbles. An analysis of it has not been met with.

Amongst the known use of this material are the following instances:—A fragment consisting of four toes, which are 1 ft. 8 ins. across, attached to a polygonal block of marble, obtained in the island of Delos, and now in the British Museum; it is of that "splendid broader grained and sparry quality peculiar to

the Naxian quarries"; STUART, *Antiq. of Athens*, fol., Lond., 1827, new edit., iii, 127, note. "The only Parian marble employed at Athens is in the bas-reliefs of the temple of Theseus; everything else, except some enriched soffits, is of Pentelic marble"; STUART and REVETT, *Antiquities*, fol., Lond., 1816, iv, 21. The statue of Minerva in the Vatican, the Venus de' Medici, the Dying Gladiator, the Antinous, and other ancient Greek works. Several important temples have been built of this material, such as that of Apollo at Delphi, rebuilt by the Alcmæonidæ. PROCOPIUS in the sixth century noticed that the mausoleum of Hadrian at Rome was "built of Parian marble; the square blocks fit closely to each other without any cement. —On the summit are statues of men and horses, of admirable workmanship, in Parian marble". BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 274. CLARKE, *Travels*, 4to., Lond., 1810-23. TOURNEFORT, *Voyage du Levant*, 4to., Paris, 1717, i, 195. LITERARY GAZETTE *Journal*, 1853, p. 334, and 653. ACADEMY *Journal*, 1875, copied in BUILDING NEWS *Journal*, 1875, xxix, 747. 25. 28.

ANTIPAROS, now Oliaros, contains a famous grotto, access to which is gained by rope ladders, of 12 ft., and another of 50 ft.: a rope of about 80 fathoms and two of 40 fathoms are necessary in addition to ladders. About 150 ft. by 100 ft. by 50 ft. high can only be seen at once, thus it is not so grand as the caves of Adelsberg. M. de Nointel descended into it at Christmas 1673. The ancient Greek inscription recording the names of persons who had visited this grotto, was deciphered by Col. LEAKE in 1806. TOURNEFORT, *Voy.*, ii, 185. 28.

PAROTIDES, PAROTIS, and PROTHYRIDES, or side ear. Other Greek names for the ANCON, the console or truss serving as an apparent support to the end of a cornice over the ANTEPAGMENTA or dressings of doors. It is also called *ους τῶ ὑπερθύρω* in the inscription relating to the Minerva Polias at Athens; and is characteristic of the Ionic style of architecture only. 79.

PARPAING. The French term for a stone called by English writers, parpain, parpaigne, parpane, parpin, parapent, parpent, parpoint; also perbend, perpend, perpent, perpender, perpeyn, and more usually PERPIN. "Lapis frontatus, qui utrinque lævigatus parietis crassitudinem exæquat," SKINNER. "Neck moulding, crocketed in canopies, forming the upper part," in DALLAWAY, *Discourses*, 8vo., Lond., 1833, p. 172. "A stone which being smoothed on both sides is just and even with the thickness of the wal: or a stone that goeth through the wal, and is seene on both sides thereof: a perpender, or parpent stone": JUNIUS, *Nomenclator*, edit. by HIGINS, 12mo., Lond., 1585. Any stone of a thick wall which shows both ends. The term is still used in Gloucestershire and Yorkshire, and hence "Perpin ashlar"; also "through stone" in Yorkshire. In Craven, Yorkshire, a thin wall, the stones of which are built on the edge, is called a *par-point*. In Scotland, a wall in general; and in Aberdeenshire, the parapet of a bridge, is called a *parpane*; (JAMIESON, *Dict.*, Suppl. v). VIOLLET-LE-DUC, *Dict.*, represents a "parpaign" as double the width of a *boutisse* or bond stone. 16.

"A perpin or parpin was a quarry term for an unsquared stone of a less size than an ashlar, but which being scalped, broached, or wrought, and used with ashlar, the whole work was ashlar." "*Perpen ashlar*; a provincial term—a corruption I imagine of perpendicular, as the stone in this form (4, 6, 8, or 10 ins. thick, and 10, 12, or 14 in. courses; and from 2·6 to 4·6 long) is placed on edge, and must of course be set very plumb or perpendicular; and the edge or bed truly square with the upright face"; WOOD, *Cottages*, 1788, p. 7. "Towards the east end of the perpeyn wall of S. Nicolas church, Romney, on the south, is a blocked orifice with hinges;—western part of the perpeyn wall; —the south chancel aile, the sedilia are in the south, not in the perpeyn wall"; ECCLESIOLOGIST *Journal*, 1849, ix, 341.

Parpoint walling is a term used at Manchester. "Parpoints may consist of wall stone, block-in course, or ashlar. Stones of this denomination are used in walls, such as battlements, or parapets to bridges. The faces may be rough, or rubbed, or of any intermediate grade of workmanship"; RAWLINSON, *Masonry Construction*, read at Liverpool Architectural Society, 27 Jan. 1858; BUILDER *Journal*, xvi, 103. *Parpoint work*; a description of walling consisting of small squared stones laid in tolerably regular courses, with throughstones at intervals of 5 ft. or 6 ft., the whole well grouted: BREES, *Illust. Glossary*.

PARPEINCOIN. A squared stone, extending across the face of a buttress so as to form the coign at each angle, costing 5½d. per foot, is mentioned 1367-9 in works at Rochester castle; ARCHÆOLOGIA CANTIANA, ii, p. 3.

PARQUETERIE, PARQUETRY and PARQUETAGE (Fr. *parquet*, an enclosure). Inlaid work of wood in geometric patterns, generally composed of two colours, but now of three, four, or more, and used for floors, borders of rooms, ornamental ceilings, wainscots, and surbases, or dadoes. The Fr. term *carcasse* is applied to the frame of a sheet of parquet, fitted with its cross-bars, and only requiring the tiles or squares to fill in. Wood flooring, laid in patterns, is of ancient use: they are in common use in France; and are often very costly, constituting not unfrequently the richest feature of the salons in which they appear, being waxed and polished with as much care as is bestowed upon the most valuable articles of furniture in Great Britain. The ordinary method on the Continent of laying down a parquet is by drawing the pattern on the floor prepared to receive it, and then proceeding to lay it down piece by piece until the whole is completed. 18 April 1680, EVELYN noticed one room at Cashiobury "parquetted with yew, which I lik'd well". TRUCHET, *Mémoires sur les Combinaisons*, in *Mémoires* pour l'Académie royale des Sciences for 1704. "Not to be forgotten are the floorings of wood, which Her Majesty the queen mother has first brought into use in England at her palace of Somerset house, the like whereof I directed to be made in a bed-chamber at Berkley house. The French call it *parquetage*, a kind of "segmentatum opus", and which has some resemblance to these magnificences (mosaic work), because it is exceedingly beautiful and very lasting"; EVELYN, *Account of Architects, etc.*, 1697, fol., Lond., 1707, p. 57.

In 1840, Steinitz and Co. established "parquetry works" in London; they formed plates of wood ¼ to ⅜ths inch thick, fitted on stout oak compartment frames 1⅛ in. thick in squares, diagonals, or in any other form, according to design; being thus framed, they are laid down with certainty and solidity, with a very even surface, the joinings perfectly close and firm. BUILDER *Journal*, 1843, i, 431; 450. A series of patterns were given in several numbers of the ART UNION *Journal*, 1845. The only award for parquetry in the International Exhibition 1862, for "excellence of workmanship" was given to this "London Parquetry Works", the original manufacturers of "solid parqueterie" and of the greatly improved system of "double thicknesses". In 1857 Messrs. Arrowsmith introduced a "patent solid Swiss parqueterie", formed of the various woods cut into the required geometric shapes, inch or ⅛ths inch thick, grooved and tongued together in squares, combined with marine glue with the greatest precision; and as a precaution that no warping shall take place, each square is tied together at the back by strips of wood, which cross all the separate pieces in each square. About 1866 Messrs. Howard advertised "Wood Tapestry" for "covering walls, ceilings, and other surfaces with real wood at a less cost than painting and graining": and 1876 a "patent portable parquet", made of any solid wood and laid round rooms in a similar manner to oil cloth. In 1870 G. N. Mansfield patented a method of making inlaid flooring, being wood-veneers backed up with kamptulicon and attached by marine glue; BUILDING NEWS *Journal*, 1870, xviii, 24: and 483, notices one made at Chicago, composed of lath-shaped strips of varieties of handsome woods glued on a twilled canvas bottom; the wood is kiln dried, and the material can be removed from place to place. Samuel Worssam and Co. exhibited at Vienna some machines patented by them for making parquetry;

as described in BUILDER *Journal*, 1873, xxxi, 649. Patterns of flooring are prepared for selection by customers by each manufacturer. The "wood-block paving" (Mr. W. White's system) is a sort of parquetry, and in effect resembles the ordinary French parquet: it consists of deal 3 ins. square and 9 ins. long, which can be laid in squares on a prepared foundation.

PARRELL; see PARELL.

PARRIS (A.....), of Boston, Massachusetts, United States of America, where he designed 1811 the large Massachusetts general hospital (Greek Doric). On the war of 1812 breaking out, he entered the service, holding the rank of superintendent of artificers with the title of captain. He resumed the profession at the close of the war, and at Boston designed the Faneuil hall or Quincy market 1827 (Greek Doric): the court house: and many of the churches and most of the edifices built on Beacon, Tremont, and Somers, streets, since 1815; which are noticed in the article BOSTON in this work; also "Dr. Young's, S. Paul's, Dr. Barrett's, and other churches; Quincy market stores on North and South Market streets; and *both* the court houses; with other numerous structures: as well as a large portion of the architectural engineering of the town. About 1830 he was appointed superintendent of Charlestown navy yard, and constructed the dry dock, the rope walk, and other granite edifices in the yard. About 1843 or 1844 he was stationed at Portsmouth in a similar capacity. Many of the lighthouses on the northern and eastern coasts of the States, comprising almost the only permanent erections of the class, it is said, have been built from his designs and under his directions. As a master mason of the fraternity of masons, he laid the corner stone of the Bunker hill monument, 17 June 1825. Among his pupils were G. I. F. Bryant, Charles Hastings, Calvin Brown, Luther Briggs, jun., and Robert Briggs. He died 16 June 1852, aged 72 years. BOSTON TRAVELLER *Journal* for June 29, 1852.

PARROCK, sometimes used formerly for PADDOCK.

PARROTT (.....), *built* 1628-33 under the superintendence of Sir J. Vaughan, knt., governor of Londonderry, for the citizens of London, at a cost of £4,000, the cathedral of that town, being probably the last old cathedral erected in the Gothic style in Ireland.

PARROTT'S BROWN. A new brown prepared for oil and water-colour painting, from the smut of corn. 48.

PARS (WILLIAM), A.R.A., a portrait painter, was born 1742 in London. In June 1764, he was selected by the society of Dilettanti to accompany as draftsman Chandler and Revett to Greece, and returned about Nov. 1766. He was again sent 1775 by the society to Rome, and died there of a fever in the autumn of 1782. Many of the original drawings made for the society are now deposited in the print room of the British Museum. Wilm. Byrne engraved a selection of his Greek drawings for the society; Woollett and Sandby engraved others. He sent stained views of temples in Asia Minor and Greece to the royal academy of arts. REDGRAVE, *Dict. of Artists*, 8vo., Lond., 1874.

PARSEES. The living representatives of the Persian followers of Zoroaster, and are fire worshippers. This worship of fire is explained as symbolical only. Their mode of sepulture is extremely peculiar; it is based on their religious ideas regarding the purity of the earth and of the elements. On Malabar Hill, Bombay, stand their "towers of silence"; these are three in number, masses like Martello towers; they are about 40 or 50 ft. high, and as many in diameter. A sort of shelf or grating is carried round the summit of each tower, which slopes inward towards the centre, and is open to the ground below; on this the bodies of the dead are laid in a certain order according to age and sex. They are thus exposed beneath the sky,—and are left to be devoured by vultures. These towers are removed from any habitation, and, situated as they are among scattered palm trees, are greedily watched by foul birds: GOOD WORDS *Journal*, Feb. 1869, p. 102. *Avesta: The Religious Books of the Parsees*, transl. by BLEECK, 1864, from SPIEGEL'S German transl. of the original MSS, Vienna, 1860. The *dokhmeh*, ossuary, of the ancient Parsees, is a low round tower built of large stones, and usually elevated upon a platform of the same material; into the open top of which human bones were promiscuously cast, after the flesh had been torn from them by vultures or other birds of prey, and when they had been sufficiently blanched by the rain; CHARDIN, *Travels*, fol., Lond., 1686, viii, 96; 378.

Somewhat similar structures are noticed as being scattered about the hills surrounding lake Titicaca in South Peru. They are called *Chulpa*, and are built of stones in the form of a tower, but increasing in width towards the top, and rudely domed over by overlapping stones. Most of them are round on plan, but some are square and two stories high, the upper story being covered with overlapping stones cut to the arch shape. Many of these are of hard stone, well fitted together, and the chambers are lined with a cement still in good preservation. ENCYCLOPÆDIA BRITANNICA, 9th edit., art. Architecture, p. 451, by professor LEWIS; from SQUIER, *Primeval Monuments of Peru*, 8vo., New York, 1870.

PARSER. An instrument mentioned as used by masons and carpenters. Thus in "1400, duo parsures unum thixtill"; SURTEES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859, p. 349. It may mean a bradawl, a pointed piercer, hence parser.

PARSLEY, the Petroselinum sativum, which is a native of Sardinia. The variations of the Greek acanthus by the Romans and Italians have led to some of the foliage in the capitals being said to be like the parsley, etc. PALMETTE. PLUTARCH, *Symp. Quæs.*, v, q. 3, states that during an interval, chaplets of parsley (Σέλινον), the prizes at the Nemæan games superseded those from the fir, given to the victors at the Isthmian games at Corinth, which, however, afterwards recovered its pristine honour: STUART, *Athens, etc.*, fol., Lond., 1827, iii, 117, note.

PARSONAGE HOUSE; called MANSE in Scotland. The residence provided for the incumbent of a living. Every church of common right is entitled to house and glebe; and the assigning of these at the first was of such absolute necessity, that without them no church could be regularly consecrated; they are both comprehended under the word manse. BURN, *Eccles. Law*, 8vo., Lond., 1842, s.v. Glebe Lands, ii, 296-303 p.; and 146a-157, s. v. Dilapidations. The house is usually in the vicinity of the church; and has the ordinary appendages of a town or country house; besides in some instances an oratory; a school, etc. WHITAKER, *Ancient Cathedral of Cornwall*, 4to., Lond., 1804, ii, 135, states that it was frequently called a college.

At Barnack is a rectory of the XIV cent.; ancient ones at Uffington; at Market Deeping, lately (1843) restored; at Enfield; at Wimbledon, restored 1863; at Chew Stoke, Somersetshire, dated 1529, used in 1829 as a poor-house (RUTTER, *Delineations*, 4to., Lond., 1829, gives a woodcut, used also in GENTLEMAN'S MAGAZINE, xcix, ii, 331); at Framilode, Gloucestershire, early XIV cent., which had a chapel (FOSBROKE, *Hist.*, 4to., Lond., 1807, i, 323); as also had Kingsbury, Somersetshire (COLLINSON, *Somerset*, 4to, Lond., 1791, ii, 468): TURNER and PARKER, *Dom. Arch.*, 8vo., Oxford, 1859, iii, 12, illustrates Chesterton rectory, Cambridgeshire, temp. XV cent., a mixture of warlike and domestic features: for parsonages were sometimes fortified; thus the bishop of Durham 1483 licensed John Kelyng, rector of Houghton, "to enclose, fortify, and embattle a tower above the lower porch within his manse"; BILLINGS, *Durham Churches*, 4to., Lond., 1846, p. 4.

Act to promote the residence of the parochial clergy, 17 Geo. 3, c. 52; explained 21 Geo. 3, c. 64. Ecclesiastical Dilapidations Act, 34 and 35 Vict., c. 43. ECCLESIOLOGIST *Journal*, 1843, ii, 145. BARTHOLOMEW, *Construction and Arrangement of P. H.*, in BUILDER *Journal*, 1847, v, 465-8. A statement of the supply of parsonage or glebe houses to the benefices in England and Wales, is given in BUILDING NEWS *Journal*, 1864, xi, 653; S. Asaph being the best supplied. SEDDON, in ARCHITECT, ETC., *Journal*, 1850, ii, 457.

Modern designs are given in BUILDER, BUILDING NEWS, and ARCHITECT, *Journals, passim.* WILKINSON, *English Country Houses*, etc., 8vo., Oxford, 1875, 2nd edit.

PARSONS (WILLIAM), practised for many years at Leicester, and designed S. George's church, opened 29 Aug. 1823; it is 92 ft. long by 64 ft. wide, and has a spire 170 ft. high. It formed one of the series of "Church medals", and is given in BRAYLEY, *Graphic Illustrator*, 4to., Lond., 1834, p. 121. He died at Thurnby near Leicester shortly before 1861.

PART. A term in occasional use; as part of an order, etc.

PARTERRE. The Fr. term (derived from the Lat. verb *partiro*, to divide, anciently signifying a place to build, *area hortensis*), adopted in England, for that portion of a pleasure ground laid out either in flower beds of a fanciful shape; or chiefly consisting of grass, or of grass and flower-beds. In 1703 it was described as "a level division of ground, facing for the most part the south and best front of a house, and generally furnished with greens, flowers, etc. There are several sorts of them; as bowling green, plain, embroidered, etc. 'Plain' parterres are more beautiful in England than in any other country, by reason of the verdure and excellency of our turf. Shell and scroll work, with sand alleys between them, are those called 'embroidered'. An oblong is the most proper figure for a parterre. There should be a terrace walk on each side of it, for an elevation for a view, and therefore there should never be the flat of a parterre between terrace and terrace walk above 300 ft., nor can it well be less than 140 ft. The adorning and furnishing them depend upon fancy. The making a parterre too large, causes a diminution of wood, the most valuable part of a garden". (NEVE, *Dict.*; and MILLER, *Gardener's Dict.*)

"Their [the English] stiff regular plans (after the Dutch manner) were always stuffed up with trifling flower knots, parterres of cut work, embroidery, etc.":—the latter "consisted of grass, sand, shells, brickdust, etc., crowded with evergreens, were the first cause of these still regularities.—The plainer parterres are, the more grandeur; for when they are stuffed up with so many small ornaments, they break the rays of sight, and the whole appears a confusion.—(Such are) those grand and beautiful plots, or parterres, of grass in the gardens belonging to Ham House in Surrey, opposite to the hon. James Johnston, at Twickenham,—The parterre garden at Hampton Court palace, towards the park,—(and) the other parterres looking to the river Thames.—"No regular evergreens, etc. (should) be planted in any part of an open plain or parterre: no borders be made, or scroll-work cut, in any such lawn or plain parterre; for the grandeur of those beautiful carpets consists in their native plainness": LANGLEY, *New Principles of Gardening*, 4to., Lond., 1728, Introd. iv and v; p. 194-5.

"Parterre or flower gardening" is described in LOUDON, *Country Residences*, 4to., Lond., 1806, p. 314, who appears to use the word as for a series of flower-beds. On p. 337 he states "The form, extent, and kinds of parterres are various, from the general flower-garden to be met with in several places of England, as at Nuneham, Beaumont Hall, etc., to the remains of the ancient French parterre, containing the arms of the family cut out in box, divisions of sand and shell work, and trees shaped into men and animals, as at Wentworth Castle, and Levens Park, as laid out by king James VI's gardener." And on p. 338 he writes, "A general flower-garden, or parterre, should contain such a variety of beautiful trees, shrubs, flowers, etc., as that a number of each will be in perfection every month of the year, particularly in the summer season. They should be placed in irregular groups and thickets, of different sizes, gliding into one another on smooth lawn, beautifully varied, and broken into small, confined scenes, by trees and shrubs of the most elegant sorts. Throughout the whole, smooth gravel walks should wind in a graceful, easy manner.—The greenhouse and stoves may be here placed—; a few elegant seats, both covered and uncovered, may be introduced; but no grottoes, urns, busts, nor temples,—which are more proper for ornamental scenery."

The term is now not often used in England. 5. 25.

MOUNTAIN, *The Gardener's Labyrinth, wherein are set forth divers Knottes and Mazes, cunningly handled for the beautifying of Gardens*, 4to., 1571. MOLLET, *Le Jardin de plaisir, contenant plusieurs Dessins de jardinage, tant parterre en broderie*, etc., port. and 50 pl., fol., Stockholm, 1651. SERLIO, *Architettura*, fol., Venice, 1663, b. iii, 358, gives four woodcuts of beds. VANDER GROEN, *Le Jardinier du Pays Bas:* 24 *nouveaux Modèles de Parterres à la Françoise, etc.*, 4to., BRUX., 1672. LE BLOND, *La Théorie*, etc., 4to., Paris, 1709; transl. by JAMES, *Theory and Practice of Gardening; Parterres, Groves, etc.; plans and dispositions of gardens, etc.*, 4to., Lond., 1712. DEZALLIER D'ARGENVILLE, *La Théorie et la Pratique du Jardinage*, 4to., La Haye, 1711 : 1715. LANGLEY, *Principles of Gardening, or the Laying Out and Planting Parterres, Groves, Wildernesses, etc.*, 4to., Lond., 1728, praising the publications of SWITZER, *Iconographia Rustica*, 8vo., 1718; and of JAMES, as above. D'AVILER, *Cours d'Architecture*, 4to., Paris, 1720, and other editions. DUMONT, *Détails, etc.*, fol., Paris, 1763-6, has in pl. 71-72 given a "projet d'un bosquet" laid out on the plan of S. Peter's at Rome. BLONDEL, *Cours*, 8vo., Paris, 1773, iv, 21, and pl. 1 and 2.

BROOKE, *Gardens of England*, fol., Lond., 1858. LANDSCAPE GARDENING, and ORNAMENTAL GARDENING. BOSQUET.

PARTHENON, The; or temple to Minerva; temple of the Virgin; or the Hecatompedon; see ATHENS. OPTICAL CORRECTION.

PARTING STRIP. The slip of wood inserted in a groove made for it in the middle of the width of the pulley style of a sash window, to keep the two sashes in their places when being raised or lowered. When this slip is beaded on the outer edge it is usually called "parting bead".

Parting strip or slip is also the name of the thin piece of wood fixed in the frame to keep the two sash weights apart. Both of the above are shown in the woodcut, s. v. Boxing.

PARTITION (Fr. *cloison;* Ger. *scheide-wand*). The division in the interior of a dwelling. It is usually formed of timber, either covered with plastering or wood lining, or occasionally filled in, sometimes having the wood framing exposed. It must consequently be strong enough to resist the vertical weight which may be brought upon it, and the efforts calculated to produce lateral displacement to which it may be exposed. At the same time, it is important to provide against any of the changes of form which occasionally are produced by the action of moisture, or of heat, upon the wood. It is extremely difficult to ascertain the precise nature of the efforts to which a partition of this sort may be exposed, and indeed practically little attention is paid to them; for the empirical rules laid down by RONDELET, CLAUDEL, etc., are sufficient to ensure the solidity of a structure of this description. These rules are, to make the thickness of a partition of framed carpentry equal to half of that required for an ordinary wall, when it has to support a floor; or only a quarter when there is no such load; but of course the ordinary economical considerations with respect to the conversion of timber modify these theoretical deductions. CLAUDEL gives (by inference) the formula, $E = \frac{L+H}{72}$, as the expression of the thickness in the former case, and $E = \frac{L+H}{144}$ in the second; in which E = the thickness, L the length of wall divided by the cross partition, and H the height of the story. In all ordinary cases the results obtained by the application of this formula will be found to be rather in excess of those actually necessary for stability; hence perhaps the expression $E = \frac{L+H}{80}$ would more correctly represent the practice of English architects accustomed to employ fir timber. The great objections to *timber partitions* consist of, 1, the shrinkage of the wood; 2, their permeability to sound; and 3, their combustibility. The advantages are, 1, lightness; and 2, their comparative thinness as compared with walls in similar positions. *G. R. B.

A "quartered partition" is so called from its *studs, quarters,* or upright timbers; and is commonly lathed and plastered. The sides of a partition may also be counter-lathed for the prevention of sounds passing through it. When the space between the uprights is filled up with bricks laid flat or on edge it is called a "brick nogged partition". When a partition is of some extent, or height, or has to carry floors above it, a truss is formed in it, hence it is called a "trussed partition"; but when placed on the ground or a firm basis, the upright timbers alone are usually deemed sufficient. These partitions are represented in most publications on *Carpentry.* TREDGOLD states that the "weight of a square of partitioning may be taken at from 1,480 to 2,000 lbs." GWILT, *Encyc.*, § 2,024, says that a square of common partition weighs rarely less than from 13 to 18 cwt. A common sort of partition is called BOARD AND BRACE WORK. Deal partitions are for common purposes; their varieties, from inch to 2 inches thick, are detailed in most *Price Books* and *Specification* works. An improvement has been suggested for cottage purposes, in two thicknesses of ½-in. or ⅝-in. red or white deal, matched, or half-jointed boarding, with felt placed between; also 2-in.×¾-in. red deal battens (or stronger if required), nailed on felt, about 15 in. apart, so as to make both faces of the boarding true and solid for nailing the two thicknesses of boarding together. Without the battens the lap of the felt would cause an uneven surface, and would not be solid. For better buildings, and where trussed partitions are required, the space between may be 2 in., or more, and filled in with sawdust and fine ashes mixed together. A movable partition in lieu of folding doors, etc., worked by means of "a swivel apparatus", has lately (1877) been patented by D. J. Williams of Birmingham, and serves the purposes of shifting partitions, folding up for school purposes.

Partitions are also made of thin slabs of sawn stone; of brick on edge in cement, or of brick flat in mortar or cement, these when steadied by the floor joists, or the joists rested upon them, are exceedingly strong. Tiles in cement with wood plugs for the dressings, are sometimes used to save space. Porous terra cotta bricks, HOLLOW BRICKS, or tiles, or any of the manufactured building blocks containing hydraulic lime, make reliable partitions, 4 in. or more in thickness, and not requiring any extraneous stiffening. POT CONSTRUCTION. The following method describes a light and fireproof partition practised in Chicago and elsewhere. Strong wires (about No. 10) are strung from floor to ceiling 4 ins. apart; boards are then set up on one side an inch from them; gauged mortar is then thrown against the boards until it is 2 ins. thick, thus enclosing the wires. The face being smoothed, and the boards removed, a solid partition is obtained. Similar partitions have been formed in England by setting up ⅜ths inch iron rods and filling up with 2 ins. of Portland cement concrete.

A "glazed partition" may have wood, or iron, frames, with sheet-glass in the divisions for the upper part, as in counting-houses, etc.; the panels being of wood, iron, or slate. These, however, have been found not to prevent sound passing through; which may be nearly effected by double glazing. When the putty dries, however, fine dust gets in between the glasses and slightly obscures them, and the interior cannot be cleaned. Plate-glass excludes sounds. A partition, or floor, filled with slag wool (silicate cotton), which is very light, is stated to be completely sound proof; that the wool is imperishable, no vermin can live in it, and that it is incombustible.

A lath and plaster partition has this feature, that if flames can be kept from getting behind the plastering, it is long before it succumbs in a fire, as in the case also of ceilings. Recommended for the same preventative are, Dixon's dry laminæ; and a prepared slating, manufactured at Manchester; also wire-work, as described in GWILT, *Encyc.*, § 2246 b and c; also thin iron plates, as suggested by Thomas Pearsall, in 1812, REPERTORY OF ARTS, xx, 193. Much of the disadvantage arising from shrinkage may be avoided where timber partitions are carried up one above the other for several stories, by the omission of the cill plate; thus the head of the lower partition being used as the cill of the one above; and when the space from the head-plate up to the top of the skirting of the floor above is bricknogged, the spread of fire would be much impeded. 5. 25.

A few notices of a partition occur in early English documents. The will of Robert Birks of Doncaster, alderman, proved at York 30th July 1590, gives to his son Robert all "the seeling work and portalls in and about the house where he dwelt, with all doors, glass windows", etc., in full of his child's portion of his goods, and then his *house* he gave to his wife for her life: NOTES AND QUERIES, iv, 328. In this case the word "portals" can hardly mean doors, these being mentioned with them; if it means neither porches nor dressings to doorways, it may signify the framing that sometimes formed a small lobby within a large room; the word "seelings" indicates partitions of wood framing; for in Yorkshire it still means a wooden or plastered vertical partition, as well as a horizontal ceiling. W. R. C.

Thus BAYLEY, *History of the Tower,* fol., Lond., 1824-5, i, App. xxviii, xxxi, quotes "a partycion thereyn seeled with lime and here", and "the playn selyng of the est side thereof with new waynscot"; and GAGE, *Hengrave Hall,* 4to., Lond., 1822, quotes "chambers to be seeled for 6, 7, and 15 ft. in height". BAYLEY, also, i, App. xxi, gives "Item. made iiij pticions otherwise called party wallys—to devyde the howses of office". At the preceptory, Chilborn, Northumberland, dating at the end of the XIV century, "the partitions were of oak plank placed in a groove at top and bottom, with a narrow reed ornament on their faces, 3 ins. in thickness, placed at a distance of 12 ins., and the interstices filled with loam"; TURNER and PARKER, *Dom. Arch.*, 8vo., Lond., 1853, ii, 198.

In France, partitions are usually executed in a manner essentially different to that in this country. A sort of wood framework is made, without much complication of carpentry, as it rarely consists of more than upright posts, with stouter ones at the doorways, and a few discharging braces or horizontal ties. The posts, *les poteaux,* are spaced (*entrevous* is the space between) about 1 ft. 4 in. apart; the door-posts, *les poteaux d'huisserie,* are planed to form the architraves. Upon the former posts are nailed laths, mostly of poplar or fir, which are from 3 to 4 ins. wide and about 4½ ins. apart. The interior is then filled with old plaster rubble or light stone, and the outer surfaces rendered, as for walling. Such partitions are light and keep out sound. Tiles made of plaster are sometimes used, but it is not so solid as the usual one of only employing rubble, for the plaster does not adhere so well to the smooth face of the tiles; but it avoids a very considerable amount of humidity. As a rule the French prefer a wall, where the English too often place a trussed partition. BURNELL, *Preparation, etc., of Gypsum,* read at the Institute of Brit. Archts., 1849-50; and printed in CIVIL ENGINEER, ETC., *Journal,* xiii, 188.

PARTOES (HENRI LOUIS FRANÇOIS), born 24 August 1790 at Bruxelles, designed and superintended 1838-43 the hospital of S. John at Bruxelles for 350 infirm and incurable patients: it was founded *cir.* 1190, and its old chapel demolished 1846. GOETGHEBUER, *Choix des Monumens,* fol., Gand, 1827, p. 76.

PARTRIDGE-EYE BRECCIA; see BRECCIA.

PARTRIDGE WOOD; see HEISTERIA coccinea. 14.

PARTY-COLORED. A term employed by painters to denote work that is painted of two tints of the same colour, as when the styles and rails of a door are painted lighter or darker than the panels; etc. It is also written "particolored".

PARTY FENCE, or *garden wall.* It is not regulated by the Metropolitan Buildings' Act 1855, as was the case under the previous one, there being now no restriction as to height or mode of construction.

PARTY STRUCTURE. This term, as defined in the Metropolitan Buildings' Act 1855, "includes party walls, and also partitions, arches, floors, and other structures separating buildings, stories, or rooms, which belong to different owners, or

which are approached by distinct staircases or entrances from without". The formation of these structures is regulated by the Act

PARTY WALL. The wall dividing the premises of two adjacent owners, and standing upon the land of both, presumably in equal moieties; the adjacent owners are *primâ facie* tenants in common of such wall and land. The construction and thickness of party walls and the rights and duties of their owners in London are clearly defined by the Metropolitan Buildings' Act. In other parts of Great Britain their construction is frequently a matter of private arrangement; in the absence of such arrangement the rights and duties of owners are derived from the Roman Law of Servitudes. In law, a party wall is defined as having no central division line either real or assumed. Generally, on one side is the owner of the *dominant*, on the other of the *servient*, tenement; the owner of each has a limited ownership in the party wall, whereby he can support his timbers by it, and heighten, rebuild, or otherwise use it in such a way as not to injure his neighbour's interest in it: some of the rights exercised over a party wall partake of the nature of easements. For the purpose of protection against the spread of fire from one house to the next, a party wall should always be carried above the highest roof abutting thereon.

The Metropolitan Buildings' Act 1855, 18th and 19th Vict. c. 122, states that the term "party wall shall apply to every wall used or built in order to be used as a separation of any building from any other building, with a view to the same being occupied by different persons".

JUSTINIAN and ULPIAN, as to Roman Law. MEARS, Analysis of ORTOLAN'S *Institutes of Justinian. Institutes of Justinian.* Lord MACKENZIE, *Roman Law. Institutes of Gaius. Liber Albus*, p. 319-334. GALE, *Easements*, 3rd edit., 1862, p. 411. GODDARD, *Law of Easements.* SMITH, *Dictionary of Antiquities*, art. Servitudes. WOODFALL, *Landlord and Tenant*, art. Party Wall, 7th edit., 1856. HUNT, *Law of Boundaries and Fences*, 1870, 2nd edit. GIBBON, *Dilapidations*, 2nd edit., 1849, p. 260. WOOLRYCH, *Law of Party Walls and Fences, with Building Act of* 1844, 8vo., Lond., 1845. GRADY, *Law of Fixtures; Dilapidations*, etc., 2nd edit., 1849. COLE, *Law and Practice of Ejectment* (Boundaries of estates, etc., a wall; p. 242), 8vo., Lond., 1857. BUILDING LAWS. R. R. R.

The law of Mitoyenneté in France is set out in the "Code Civile", art. 651-676, and is the basis of all the law on the subject. PARDESSUS, *Traité des Servitudes ou services Fonciers*, 2 vols., 8vo., Paris, 1838. LE PAGE, *Lois des Bâtiments, ou le nouveau Desgodetz, contenant la théorie et la pratique*, etc., 2 vols., 8vo., Paris, 1838. FRÉMY, *Codes des Architectes et Entrepreneurs des Constructions*, etc., 8vo., Paris, 1837. FRÉMY-LIGNEVILLE, *Traité de la législation des bâtiments et constructions*, 2 vols., 8vo., Paris, 1848, 2nd edit. MIGNARD, *Guide des Constructeurs*, 8vo., Paris, 1847. *Manuel des Lois du bâtiment, élaboré par* la Société Centrale des Architectes, Code Napoléon, 516-710; 1714-2274; 8vo., Paris, 1863; 1878. DALY, *Revue Archéologique*, 4to., Paris, 1849, viii, 94; 160; etc. MARCADÉ, *Explication du Code Napoléon*, 8vo., Paris, 1859, ii, 575. DALLOZ et VERGÉ, *Les Codes Annotés*, 4to., Paris, 1873, i, 472. A. C.

PARVISE or PARVIS (Fr. *parvis*). A porch, or court of entrance to a great church or palace. The etymology is very obscure. PARADISUS. (BUILDER *Journal*, 1868, xxvi, 597, 645). Modern writers having applied this term, but apparently without any good authority, to a room often found over church porches; this subject will be considered s. v. PORCH. 17. 19. 22.

PARYS (WILLIAM), prior of Peterborough abbey, commenced 1272 the Lady chapel, and laid the first stone with his own hands; it was consecrated in July 1290; and was pulled down 1651 for the value of the materials. POOLE, in ASSOCIATED SOCIETIES, *Reports and Papers*, 1855, p. 212.

PAS (C. DE); see PASSE (C. DE).

PAS or PASCHEN (HENRI DE), born at Antwerp, designed 1568 the hôtel des villes anséatiques at Antwerp. He also gave the *plan* for the exchange in London, commenced 7 June 1566 by Sir Thos. Gresham, opened 23 Jan. 1570, and burnt 1666. REVUE DE BRUXELLES, 8vo., Brux., Oct. 1837, p. 10. COMMISSION ROYALE, *Bulletins*, 8vo., Brux., 1848-9, xiv, 50; 545. HEINDRICKX or Henrick was the chief workman employed in England. The general design was not unlike the bourse at Antwerp; CUNNINGHAM, *Handbook of London*, 8vo., Lond., 1850, p. 430.

PASA LINJA. A light brown coloured wood of Penang. A large tree, used only for planks, as it soon decays. 71.

PASARGADÆ. A large town of the ancient Persians, and thought by some to have been built by Cyrus after his victory over Astyages the Mede, which he gained near this place: here was the tomb of Cyrus, described by STRABO, xv, 728; 730; and by ARRIAN, vi, 29, 30, from the work by Aristobulus, who visited it, and had entered it by order of Alexander, in whose time it was plundered of all except the couch and the coffin. Modern writers place this town in the plain of Murghab or MOURGAUB, about 50 miles north-east of Persepolis (MORIER, *Journey into Persia*, 4to., Lond., 1812, p. 144; i, 30, pl. 29: and Sir R. KER PORTER, *Travels*, 4to., Lond., 1821-2, i, 498); the latter discovered, among the many relics of the once great capital, a building, which was imagined to be the tomb, and is called by the natives Kubr maderi Suleiman (or *Fr.* Mâder i Suleimân), the tomb of the mother of Solomon. There is no inscription on it, but on a pillar near is a cuneiform inscription, which is interpreted by GROTEFEND, in HEEREN, *Asia*, ii, 360-75, Engl. transl., as "Cyrus the king, ruler of the universe", or "I am Cyrus the king the Achæmenian"; HOECK, *Veteris Mediæ*, etc., Gott., 1818, thinks the tomb is that of a Sassanian king, of the dynasty that ruled in Persia from the III to the middle of the VII cent. A.D. PLUTARCH, *Artax.* 14. 23.

FERGUSSON, *History*, 1865, i, 183, considers that the remains at Pasargadæ are more interesting to the antiquary than to the architect: these are a platform of masonry for a temple or fire altar (called a fortress, in FLANDIN, pl. 201-3), remarkable for the beauty of its masonry and the large dimensions of its stones, which have a flat sinking, all round them; the foundations of several large buildings; and a pillar consisting of a plain shaft without capital or base. TEXIER, *Arménie*, fol., Paris, 1839-49, pl. 81-4, gives the tomb of Cyrus; and pl. 85 a fire temple. FLANDIN, *Voyage en Perse*, 8vo., Paris, 1851, ii, 79; 362; and *Perse Ancienne*, fol., p. 156, and pl. 57 a map. HEROUM.

PASELAY. A whitey-brown coloured wood of Tinnevelly, used for furniture. 71.

PASQUALE DELL' ANCISA (FRA); see ANCISA (FRA P. DELL').

PASQUIER DE L'ILE, or de l'isle, or Delisle Mansard; see MANSARD (P. DE LISLE).

PASQUIER DE L'ISLE, is believed to have designed the church of S. Jean-en-Greve, rebuilt 1322. Some authors, however, only claim for him the arch which supported the organ of the church. LEGRAND et LANDON, *Edifices de Paris*, 1806, i, 154. HURTAULT et MAGNY, *Dict. Hist. de Paris*, 1799.

PASSAGE (Ital. *passagio*; Sp. *pasage*; Fr. *passage*; Ger. *gang*). A narrow thoroughfare. In a large house it may lead from an entrance hall to the kitchen offices; from the staircase or hall to a suite of rooms on one or both sides of it, and so on. "The main corridors of the department of offices have for their purpose the compact connection of the whole series amongst themselves, with proper entrances from without, and convenient communication with the family part of the house;" KERR, *Gentleman's House*, 8vo., Lond., 1867, p. 253; who adds that up to the XVIIth cent., in the arrangement of a house, the multiplication of apartments had produced little else than doors of intercommunication between rooms, an increased number of external doors, and a few internal passages, narrow, defectively lighted, and tortuous. Then in the better class of houses it was only in inferior parts, and the chief thoroughfares were made in the novel form of corridors; and galleries were introduced.

Remarks on the propriety of rendering the architectural aspect of a passage somewhat conformable in style and treatment with the more important object to which it leads, are given by SMIRKE, *Lecture* at the royal academy, in BUILDER *Journal*, 1859, xvii, 109; and refers to the loggie at the Vatican, and to the colosseum. ACCESS. CORRIDOR. GALLERY. LANE. TRIFORIUM. THOROUGHFARE. *Dégagement* and *Dérobé* in 25 and 5.

Subterranean passages are often said to exist at important houses, giving outlets or hiding places in case of danger to the inhabitants. They are seldom found; but BUILDER *Journal*, 1858, xvi, 596, mentions one discovered at the Rye House, Hoddesdon, Herts: another, at the bottom of a shaft, at Eltham, is noticed in NOTES AND QUERIES, 1878.

PASSAGE is also the name of a public footway leading from one main thoroughfare to another, like the "rows" at Yarmouth. SLYPE. The Fr. *passage* includes a covered way, usually called in Great Britain an ARCADE. The iron-work construction of the "passage Jouffroy" at Paris is given in the ALLGEMEINE BAUZEITUNG, 1849, pl. 235, Ser. ii.

PASSALACQUA is mentioned in MILIZIA, *Lives*, ii, 338, as having given a design *cir.* 1730-40 in competition for the façade of the church of S. Giovanni Laterano, at Rome; twenty-two were submitted, that by A. Galileo was selected. 3.

PASSAU (*Batava Castra*, and *Boiodurum* opposite). A town in Bavaria, consisting of Passau proper, Ilzstadt, Instadt, and the fortress of Oberhaus erected by the bishops of Passau, and situated at the confluence of the rivers Danube, Inn, and Ilz. Over the former there is a bridge 754 ft. long, resting on seven granite piers; and a chain bridge; and over the Inn where 800 ft. in width is a timber bridge. The ancient bishopric was secularised in 1803. The cathedral is dedicated to S. Stephen, the outside of the choir dates 1407-50 (KRUMMAUER 1405); in 1562 (or 1662) the three towers and nave were burnt; the remainder was patched up 1662-80, in the Italian style, and a bell-shaped cupola erected. There are also the churches of S. Michael, S. Paul, with S. Severin, and S. Gertrude in Innstadt; also a protestant church 1859 by Burklein. The palace formerly the bishop's residence, the town house, the building dating before 1552 and now the post office, the lyceum formerly the jesuits college, and the castle of Niederhaus, are among the other edifices of note. The colossal bronze statue of king Maximilian Joseph, 1828 was designed by Eichler, modelled by Jorhan, and cast by Samassa, all natives. Close to the town is the Mariahilf berg, on which is the pilgrim chapel, its access is by 264 steps up a covered passage. Over the Rothfluss is a bridge of one arch 200 ft. span. BEATTIE, *The Danube*, 4to., Lond., 1844, p. 72. 14. 28. 50. 96.

PASSE, PAS, or Passæus (CRISPIN DE), of Cologne. He and his son of the same name published many works on Art, 1602-51. ADAMS, *Décor. Inter. et Meubles des époques de Louis XIII et XIV reproduits d'après les compositions de Passe*, etc., fol., Paris, 1861-4. *Universal Catalogue of Books on Art*, 8vo., Lond., 1870.

PASSIGNANO (.....), cavaliere, was one of those who submitted *cir.* 1590 a design in competition for a façade to Sta. Maria del Fiore at Florence; when one by G. Silvani was selected, but not executed. MILIZIA, *Lives*, ii, 172.

PASSIMBENI (ANDREA), or A. MASSIMBENI, of Cremona; *see* CALZOLARI, (ORAZIO).

PASSION FLOWER. It is a native of Peru and of New Spain, where the Spaniards called it the "flower of the five wounds"; the Clematis Virginiana of PARKINSON, *Paradisus terrestris*, 1629; the *Fior della Passione* of the Italians; was first noticed in BOSIO, *La trionfante e gloriosa Croca*, fol., Antwerp, 1610, and transl. into Latin, fol., 1617, as showing all the marks of Our Saviour's Passion, and therefore called it Flos Passionis. It has been accepted, especially in recent church decoration, as a worthy companion of the rose and the lily—sacred symbols from the most ancient times; ALL THE YEAR ROUND *Journal*, 1866, xv, 152-3. The symbolism is very strained.

PASSIUS (THOMAS), of the XII century, restored the vestibule in front of the *portail* of the church at Loches. *Bull. Mon.*, vii.

PASTAS. The Gr. term for a vestibule; as in APOL. RHOD., i, 789. HERODOTUS, ii, 169, uses it to signify the pronaos of a temple to Minerva. POLLUX, vii, 122, makes *exedra* and *pastades* synonymous terms, in which sense it might be translated parlour. 78.

PASTÉ (ANDRÉ) was 1738 master of the works of masonry to Philippe le Hardi, duke of Burgundy, at Dijon. DE LABORDE, *Ducs de Bourg.*

PASTE for removing paint; see PAINT (p. 10).

PASTEBOARD. A substance composed of two or more various layers of paper pasted together, and consolidated by a rolling press, or by a hydraulic press. "Bristol board" is a fine variety, as "mill board" is a coarse one, of the same sort of substance.

This material is noticed as used in the arts thus;—"heads and busts seemingly of stone, but really pasteboard", 1703, at Sprotburgh, seat of Sir Godfrey Copley: R. THORESBY. *Diary*, 8vo., Lond., 1830, i, 414. The literary journal of S. Petersburg 1785 mentions a new discovery which had obtained a premium from the empress Catherine, consisting of a pasteboard that no fire can consume, nor water soften; it was proposed as a lining for the wooden houses of that country, and for clothing ships of war. The preparation was considered to be alum, which was a secret used in the time of Sylla, at the seige of Athens; ANTHOLOGIA HIBERNICA for May 1794, iii, 359. PAPER SLAB, s. v. PAPER.

A "roofing pasteboard" was introduced into England by messrs. Erichsen and Co. of Copenhagen, where it had earned a good reputation, as resisting the action of fire. Experiments upon it are reported in BUILDING NEWS *Journal*, 1869, xvi, 576; 1871, xxi, 34. This "asphalte roofing pasteboard" and "asphalte mastic" obtained prize medals at Odense 1863; Paris 1867; and Stockholm and Havre 1868. It is said that the Danish, English, and German Insurance companies represented at Copenhagen, ensure goods stored in buildings covered with this material at premiums fixed for those with fire-proof roofing. A "mineral paste-board" for roofing was experimented upon by Messrs. Maillard and Co. of Paris; BUILDING NEWS *Journal*, 1868, xv, 226.

PASTICCIO. The Italian term for a work of art, being a direct copy of the style and manner of some other artist; or a mixture of styles of various tastes; and thus entirely devoid of originality.

PASTOPHORIA. The apartments occupied by a class of Egyptian priests of an inferior order called pastophori; they carried the statues of gods in the processions. *Pastoforia* was also the name often given to the apse at the end of the ailes of a nave; BINGHAM, *Origines*, ii, 475; SCHAYES, *Hist. de l'Arch.*, i, 70.

PASTRY ROOM, or LARDER. A place in large establishments in which pastry is made and stored. It should open out of the kitchen or still room, or be close to them, in the oven of either of which places the pastry will have been baked. In superior houses it takes the form of the "confectionery", where the pastrycook does his part of the work. Where there is no pastry-room, there is usually in the still-room a pastry dresser, with the pantry for storing. The requirements for such a pantry consist of a marble dresser on which the pastry is made, about 27 ins. wide and 3 ft. in length, fixed under the window, with shelves all round the walls; and under the dresser may be deep drawers for flour, sugar, etc. The room should be dry and not too cold, the floor being of wood, and the walls may be lined with that material; KERR, *Gentleman's House*, 8vo., Lond., 1865, p. 219. It is a room specified in the description of Hengrave Hall, 1525-38.

PASTURE LAND. Land devoted to the feeding of cattle and other animals; whether unenclosed, as used by some of the

wandering tribes of Asia and America; or enclosed, as in civilised countries, though traces of the former exist in this country, in the waste lands on which there is a right of common. The term is usually applied to tracts of land, which, from situation, climate, or other causes, although they are portions of estates and the property of individuals, lie nearly in a state of nature, and produce a revenue or profit only according to the number of cattle and sheep which can be reared or maintained in them. 14.

PATAC (JEAN), from Montélimart, is mentioned in the XVI cent. as having been admitted a citizen of Geneva, as a reward for his works. DUSSIEUX, *Artistes Franç.*, 8vo., Paris, 1856, p. 472.

PATAN, in Cashmere, near Sirinagur. Near it are the remains of two ancient buildings in a style similar to the celebrated temple at Matan, described by HÜGEL; THORNTON, *Gazetteer*, 1858. In Nepal, the temples usually seem to be dedicated to the Saiva faith, but at PATAN, is one where Sakya occupies the basal floor, Amitabka the second storey, a small stone chaitya the third, the Dharmadatu Mandala the fourth; the fifth or apex of the building, externally consisting of a small churamani or jewel-headed chaitya: a woodcut is given of a temple to Mahadeo, two storeys in height; and another to Krishna having the sikra or spire and the clustering pavilions: FERGUSSON, *Indian, etc., Architecture*, 8vo., Lond., 1876, p. 305.

PATAND (Fr. *patin*). "Patin, a patten or clog, also the footstall of a pillar"; COTGRAVE. A term in old carpentry for the bottom plate or sill of a partition; or the plinth on which timber work is placed. "Reredoses of timber and patands of timber", occur in the *Agreements* for constructing the desks in the Beauchamp chapel, Warwick, 1450. The base of a pillar, as the plinth under the base moldings. PATTEN. 16. 17. 19. 22.

PATARA. A ruined city of Lycia in Asia Minor, in the valley of and near to the river Xanthus. The walls surrounded an area of considerable extent; a castle, several towers and one of the gates are still existing, outside of which are stone sarcophagi, and within are temples, altars, pedestals, and fragments of sculpture, ruined and mutilated. The place was famous for a temple and oracle of Apollo, second in renown only to that of Delphi. The theatre is somewhat more of a semi-circle whose external diameter is 267 ft. 9 ins. outside, with 34 or 36 rows of marble seats; the superior preservation of the prosœnium distinguishes it from most of the ancient theatres extant; an inscription states it was built by Q. Velius Titianus, and dedicated in the fourth consulate of the emperor Antoninus Pius A.D. 145. A small ruined temple; a deep circular pit, having a flight of steps and a square pillar in the centre rising above ground, supposed to have been the seat of the deity; a ruined temple supposed to Jupiter; and ruins of thermæ, built apparently by Vespasian, are the other principal remains.

BEAUFORT, *Karamania*, 8vo., Lond., 1817, p. 2. LEAKE, *Asia Minor*, 8vo., Lond., 1824, p. 182; 320-8, gives a plan of the theatre from notes by C. R. Cockerell. SPRATT and FORBES, *Lycia*, etc., 8vo., Lond., 1847, i, 31. Sir C. FELLOWS, *Asia Minor*, 8vo., Lond., 1852, p. 222; and *Discoveries in Lycia*, 4to., Lond., 1841, p. 179. In SOCIETY OF DILETTANTI, *Antiquities of Ionia*, fol., Lond., 1797, ii, pl. 56-7, are given views of the theatre, showing the remains of the scena: and in 1840, p. 75-93, pl. 1-14, are given, from drawings partly by J. P. Gandy, a plan; a general view from the triple gate; a view of the theatre; the entrance 10 ft. by 20 ft. high to a tomb or temple; a plan of the theatre with two sections, the scene 128 ft. 6 ins. long, 3 plates of details; and an elevation and details of the triple arch (GUTTA). In TEXIER, *Asie Mineure*, fol., Paris, 1839-49, iii, is given the triple gate; an old aqueduct (noticed below); the théâtre de Vélia, etc., 2 pl.; façade and details of a ruined temple, 4 pl.; details of the door of a sepulchral chamber; and the elevation and details of a small vaulted tomb. TEXIER and PULLAN, *Principal Ruins of Asia Minor*, fol., Lond., 1865, p. 54, give the description from BEAUFORT, and in pl. 47, "details of a pilaster of a temple showing a composite capital, bearing some resemblance to that of the temple of the Winds, and to some near S. Anthony's well at Patras": and pl. 48 the entablature, etc., of the door to the temple, it being "one of the most elegant doorways of the Greco-Roman period existing in Asia Minor".

A Greek aqueduct discovered about three miles east of Patara, near the small port of Phœnicus, mentioned by Livy, crosses a valley about 250 ft. deep, and is nearly 200 ft. across; a wall of rough stone was built up, leaving a rough arch for the passage of the stream. On the top of the wall was laid in a considerably curved line a series of blocks each about 3 ft. square, well cramped together, closely jointed and laid in cement; each had a circular perforation 13 ins. diam., and a projecting collar of 3 ins., with a corresponding recess for it in the next stone, thus forming rude spiggot and faucet pipes. At intervals of about 20 ft. apart were vent holes about 7 ins. diam., for the escape of the air: as described with woodcuts by RENNIE from C. R. Cockerell, in *Transactions* of the Institution of Civil Engineers, 1854-55, xiv, 207. In the *Detached Essay*, Aqueduct, it is noticed that E. Falkener found at Patara tubes of earthenware 8 ins. in internal diameter and 1½ ins. thick; the nozzle projected 2½ ins., and was ⅜ in. thick. 14. 50. 23. 28.

PATAVIUM; the former name of PADOVA in Italy.

PATELEY BRIDGE STONE. A valuable stone which obtains this name apparently from the station at Pateley bridge on the North-Eastern railway, *via* Leeds. It is obtained from the SCOTGATE ASH QUARRIES, situated about three-quarters of a mile from the above station.

PATENHAM, PACENHAM, or PAKENHAM (THOMAS DE), is the earliest name among the master masons employed at York cathedral, that has been found. He is mentioned 1348 in the will of Sir Thomas Sampson; and in the grant 1st Oct. 1351 of a pension and a dwelling to W. de HOTON, mason, son of W. de Hoton, the dwelling is stated to have been occupied by Patenham while he lived. BROWNE, *Hist. of York Cath.*, 4to., York, 1838-47. LOUDHAM (T. DE). A John de Pakenham was treasurer of York from 1459 to 1477, in which year he died. SURTEES SOCIETY, *York Fabrick Rolls*, 8vo., Durham, 1859.

PATEN TA PHROHM; see NAGA ARCHITECTURE.

PATENT DRYER. A caustic substance used as a drying material in paint, but injurious to the durability of it, causing it to crack. It is frequently adulterated to a large extent with ground pumice stone. The only safe dryers are litharge and sugar of lead. DRIER. S. J. B.

PATENT SLATING. Slate slabs without boarding or battening. The system was introduced by the late James Wyatt, R.A., though he did not obtain a patent for it. Neither boards nor fillets are used, the slate bearing from rafter to rafter, and to which the slates are screwed. Over the joints are screwed narrow slate slips bedded in putty. Slating of this kind may be laid at no greater elevation than 10°; whereas for slating in the ordinary way the angle should never be less than 25°. Its handsome regular appearance gained for the system much celebrity at first; but it was abandoned on account of its being liable to disarrangement from any partial settlement of the building, or from any expansion and contraction, producing the dislodgement of the putty, upon which depended its being impervious to rain. 1.

PATENT WOOD; see FIBROUS SLAB.

PATENT YELLOW. A pigment composed of oxide and chloride of lead, or oxichloride of lead, in different proportions according to the method by which it is prepared. *Turner's yellow* or *Montpellier yellow*, is a submuriate or chloruret of lead. It is a hard, ponderous, sparkling substance, of a chrystalline texture and bright yellow colour, hardly inferior, when ground, to chromic yellow. It has an excellent body, and works well in oil and water, but is soon injured both by the sun's light and impure air; it is therefore little used except for the common purposes of painting. Chromate of lead has greatly superseded the use of it. 9. 14

PATERA; dim. *patella*, that is, *paterula*. An open vessel, generally flat, shallow, and circular, used by the Romans in their sacrifices, in which they received the blood of the victims, and with which they made libations. 6. 14.

PATERA (Fr. *bouton*). The name of a small round ornament placed in bas-relief upon a flat surface, as seen in almost all styles of architecture; on the Assyrian figures; in Egyptian work; in Turkish; Persian; Hindoo; Norman; Early English; etc.; in classic and Italian architecture, as in friezes and on fasciæ; where as a button it is accompanied with festoons of flowers or husks, and other accessories. They are occasionally used by themselves to ornament a space. In some instances the patera is enriched with foliage; and occasionally with a mask or a head in the centre. A large patera is called a ROSE and ROSETTE. FLOWER.

PATERNE; see PATTERN. 6. 19.

PATERNO CASTELLO (don IGNAZIO VINCENZIO), prince of Biscari, born 1722 at Catania, studied architecture, and the government confided to him the superintendence of the bridges, streets, and other works of public utility in Sicily. "He constructed 1765-77 from his own designs", a bridge, the largest in Sicily, over the river Symete, now called Regalbuto, about 5 miles from Aderno, on the road to Centorbi. It consists of two small and 31 large arches, being 1,450 or 1,540 ft. long; the arch crossing the river is 88 or 94 ft. span, and is pointed; the others being semi-circular, and in height equals that of the adjacent cliffs. Over the roadway is the Aragona aqueduct, having 47 smaller arches corresponding somewhat with those under them, and extending for 2,700 or 3,000 ft. at each end. The greatest height of this work is 120 ft. or 128 ft. *Detached Essay*, Aqueduct, p. 6; pl. 1, fig. 12: it is shown in HOUEL, *Voy. Pitt.*, fol., Paris, 1782-7, ii, 108; who, iii, 3, gives a catalogue of the important antiques in the prince's museum. S. NON, *Voyage Pittoresque, etc.*, fol., Paris, 1781-6, iv, pl. 109. The aqueduct is stated to have been blown down in 1780: and the article J. J. Huvé appears to give the credit of the design or erection of this structure to this French architect. The prince died 1st Sept. 1786. ORTOLANI, *Biografia degli Uomini illustri della Sicilia*, 4to., Naples, 1817, i.

PATERNOSTER. A term from the Latin, used in English works on architecture, for a row of beads or ovals carved as a bead moulding. Also the round or oval beads placed under ovolos. 1.

PATESLE (THOMAS), archdeacon of Ely, is supposed to have erected between 1396 and 1411 the church and chancel of Great Shelford, Cambridgeshire, with the aid of bishop Fordham. LYSONS, *Magna Brit.*, Cambridgeshire, 4to., Lond., 1808, p. 250.

PATH; see GRAVEL WALK. PAVEMENT.

PATHAN STYLE of architecture. The mahommedan Shahab ud-dîn, a Ghorian, commenced 1192 the conquest of northern India, which was effected by 1235, and for a century and a half after, the empire continued united under Pathan dynasties. Delhi was practically the capital, until Baber 1494 invaded Hindostan, and put an end to the Pathan sway, establishing the dynasty of the Moguls, 1494-1707. The Pathans erected two great mosques in Delhi and Ajmir. After the death of Ala ud-dîn in 1316, until 1539, all the buildings exhibit a stern simplicity of design in marked contrast to the elaborate ornamentation with which the style commenced. FERGUSSON, *History of Indian Architecture*, 8vo., Lond., 1876, p. 498-519.

PATHYRIS; see THEBES.

PATIN or PATEN; see PATAND.

PATIO. A Spanish term, used by architectural writers, for the inner court-yard of a dwelling house in the south of Spain, especially at Seville. They are mostly arcaded, paved with marble, have a fountain in the centre, an awning above, and form the ordinary summer apartment, where the family receives its friends. As the entrance to the house is invariably by a broad passage leading from the street to the *patio*, and divided from the latter only by an open work iron gate, the passer-by has the gratification of glimpses of the interior. The *patio* at Palma, in Majorca, is stated to be a chef d'œuvre of its kind.

PATN and LATITA PATAN. The old capital of Newar, distant about two miles from the modern Ghorka town of Katmandu, the modern capital of Nepaul. It is situated on the river Bhagmutty. The grand square, the chief feature, contains an incongruous mass of buildings, of the most varied and fantastic construction, yet massive and substantial—presenting now a sombre, quiet grey colour. The *durbar*, a huge massive building, covered with black wood carving, occupies one side of the square, in the centre of which stand two monoliths between 30 and 40 ft. high; one represents an angel, the other a Newar monarch watched over by a cobra standing upon its tail and looking over his head with its mouth wide open. On the opposite side of the square is a square temple of grey sandstone, in the form of a verandah, surmounted by a dome; the corridor around it was elevated considerably above the level of the court. Another temple by its side was a two-storied pagoda. There are also ruined pyramidal shrines. The lofty and capacious residences of the old nobility are richly carved. OLIPHANT, *Katmandu*, 8vo., Lond., 1852, p. 128. KIRKPATRICK; BUCHANAN HAMILTON, *East India Gazetteer*, 1828.

PATNA (Hind. *Padmavati*), or Azimabad, as it was called for a time, is the modern capital of Bahar. The fort is surrounded by a decayed wall and a ditch, and the city extends 1½ miles along the river Ganges, and is three quarters of a mile wide. On the western side of Patna is the suburb Baukipore, extending about 4 miles along the river, having the East India Company's offices and the residences of the Europeans. Beyond this again is Dinapore, 10 miles west from Patna, having fine barracks and officers' quarters for the government troops, and others for the native troops. The three places present along the river's bank for upwards of 15 miles many large flat-roofed houses, temples, mosques, gateways of red stone, wide ghauts, and bastions projecting into the stream. A temple below the town is given in FORREST, *Pict. Tour of the Ganges*, 4to., Lond., 1822-4, p. 148. DANIEL, *Views in India*, fol., Lond., 1795, 1st Series. TAYLER, *The Patna Crisis*—1857, 8vo., Lond., 1858 HAMILTON, *East Indian Gazetteer*, 1828. 14.

About 28 miles above Patna, the Lahore and Peshawur road crosses the river Sone, Soane, or Sohan, where it has a waterway of 750 ft., by a stone bridge over 1,000 ft. in length, having 15 spans of 63 ft. each, and a width of 52 ft. wide between the parapets. It was designed, and was in course of construction 1862, by lieut. col. Alex. Taylor, C.B., R.E., and was estimated to cost Rs. 4,28,271. Some details with a plate are given in *Professional Papers* on Indian Engineering, 8vo., Roorkee, 1863-4, i.

PATRAS. A town on the north coast of the Morea, near the gulf of Lepanto. It adjoins the site of the ancient city of Patræ, which, like Athens, was connected with the port by "long walls". Few remains of antiquity are visible, except some statues in the acropolis, which are noticed by LEAKE, *Morea*, 8vo., Lond., 1830, ii, 123-140; and the ruins of a Roman aqueduct of brick. The temple to [Jupiter and Hercules] had brick cells with stone columns and entablature; VITRUVIUS, ii, 8. The temple to Ceres, with a source of water, is perhaps now represented by a well in a vault belonging to the remains of a church of S Andrew, which was already a ruin in the time of SPON and WHEELER, *Travels in Asia Minor*, 8vo., Lyons, 1678. A view of the entrance to the castle, details of a Roman brick tomb, with vase-shaped receptacles cut in the bottom of the recesses, three fragments of statues, and three tablets with inscriptions of late date, are given in BLOUET, *Morée*, fol., Paris, 1836, iii, pl. 85-7, p. 43. 14.

PATRICE or PATRICIUS; called PATRIK in *Revue Archéologique*, v, 484. A native of England who commenced "after the fashion of Cologne cathedral" 1400-29 the church of Nôtre Dame de l'Épine near Chalons-sur-Marne, which was continued 1497-1529 by A. GUICHARD.

PATRON of a church, is always indulged with a stall and desk in the chancel or choir just within the screen; BUCKLER, *Churches of Essex*, 8vo., Lond., 1856, p. 192.

PATRON; see PATTERN.

PATRYNGTON (ROBERT DE), mason, was, probably while on the works at York cathedral, appointed 5 Jan. 1368 master mason thereof for a great portion of the present choir. His salary was fixed at £10 per annum, and the houses within the close which W. de Hoton, mason, inhabited (whom he appears to have succeeded); he contracted not to employ his time upon any other operations to the hindrance of the works; if struck with blindness or other infirmity, then to be paid only 10 marks per ann. and the houses, bestowing his counsel and advice as far as he was able; and if unwilling to labour, or withdraw himself from the works, then the contract to cease. Hugo Hedon in 1399 is the next master mason whose name appears. BROWNE, *Hist. of York Cath.*, 4to., York, 1838-47. SURTEES SOCIETY, *Fabric Rolls*, 8vo., Durham, 1859.

PATTADKAL in Dharwar; see PURUDKUL.

PATTAN SOMNATH; see SOMNATH, in Hindostan.

PATTE (PIERRE), born 3rd January 1723 at Paris, became a pupil of Boffrand. In 1765 as "architecte de S. A. S. Mgr. le prince palatin duc régnant de Deux-Ponts", he designed the two wings of the ducal palace, and the palace of Saresbourg in imitation of the Grand Trianon at Versailles. In 1773 he made plans for the rebuilding of the church of Bolbec (Seine Inférieure) which were not adopted; but in the following year a new plan by him was carried out and the church consecrated 25 Feb. 1781: his pulpit still remains, but the marble altar was destroyed at the Revolution. He had designed the *salon* in the hôtel de ville at Grenoble, before 1767. The most important work by him at Paris is the hôtel de Charost. He published at Paris, *Discours sur l'Architecture*, 8vo., 1754. *Abrégé de la vie de G. Boffrand* (died 1754), 8vo. *Etudes d'architecture en France et en Italie; première suite*, 8 pl., 4to., 1755. The *Mémoires* of Charles Perrault, 12mo., Avignon, 1759. *Monuments érigés à la gloire de Louis XV*, etc., 57 pl., fol., 1765; 1797. *Mémoires sur les objets les plus importants de l'architecture*, 27 pl., 4to., Paris, 1769, a very useful work, in which Patte anticipates some of the most remarkable arrangements of civil economy which have been recently adopted in London. *Memoires—sur la construction de l'eglise Ste. Geneviève*, 4to., (Amst., 1770); and also in p. 185 of the above work: (this was criticised by GAUTHEY, *Mémoire*, etc., 4to., Dijon, 1771; and *Diss. sur les dégradations survenues aux piliers*, etc., 4to., Paris, 1798; and by RONDELET, *Mémoire Hist.*, etc., 4to., Paris, 1797). Patte contributed the fifth, sixth, and ninth volumes of BLONDEL, *Cours d'Architecture*, 8vo., Paris, 1777, after the death of Blondel (1774). He also published *Description du théâtre de la ville de Vicence*, 4to., 1780. *Essai sur l'Architecture théâtrale*, 3 pl., 8vo., 1782; transl. into Italian by G. Ferrario, 8vo., Milan, 1830. *Suite de Mémoires qui interressent particulièrement Paris*, 3 pts., 4to., Paris, 1800. *Projet d'éclairage pour une grande ville. Description historique de la colonnade du Louvre. Mémoire sur l'achèvement du portail de S. Gervais, etc. Mémoire sur l'achèvement du grand portail de l'église de S. Sulpice*, (*cir.* 1771). Several plates accompanying his works are engraved by himself; as also a collection of six plates of perspective and architecture after Piranesi; and an allegorical temple of Venus after Lorrain, June 1755. He died at Mantes in 1812, or 1814. DUSSIEUX, *Les Art. Franç.* 68. 113.

PATTEN. A pillar, stand, or stool, also called a straddle, placed upon the ground, and upon a number of which a superstructure can be raised, thereby preventing it becoming an adjunct to the freehold, and hence held to be removable before the end of a term of lease. A Dutch barn, haystack, granary, etc., are often so built in the country. CHITTY, *Law of Contracts*, 8vo., Lond., 1857, p. 323. Elwes *v.* Maw, in EAST, *Reports*, iii, 38, before Lord Ellenborough. PATAND. Crakehou, a village in Yorkshire, "principally belonged to Bolton abbey, and was granted to the first earl of Cumberland; from a survey made in the time of the third earl, it appears that every house and barn stood upon crocks, and was covered with thatch"; WHITAKER, *History of Craven*, fol., Leeds, 1878, p. 528.

The patten (Fr. *patin*) of a weathercock, is the stand to which the centre rod or vane is attached.

PATTERN. (Lat. *forma*; Ger. *patron*, a model; Fr. *patron; modèle; forme; portrait.*) An example set up from which another is copied. A form to work by. A drawing or model for the guidance of workmen. DRAWING. EXAMPLE, or EXEMPLAR. A patrone, patren, or patern. MODEL. MOULD. PLAT or plot. PORTRAITURE. TEMPLET. VIDIMUS. 6. 19.

"After the pattern of the tabernacle—. And look that thou make them after their pattern which was showed thee in the mount:" EXODUS xxv.

"1352, Jan. 2; To John Lambard, for two quatern' of royal paper for the painter's patrons (patterns), 1s. 8d.; and Sept. 3; To George Cosyn, for one quatern' of royal paper to make the painters' patrons, 10d.;" BRAYLEY and BRITTON, *Westminster*, 8vo., Lond., 1838, p. 183, 185. BARRETT, *Bristol*, 4to., Bristol, (1789), on the authority of a parchment manuscript of Rowley's communicated by Chatterton, states S. Mary Redcliffe church, "June MCCLXXXXI hee" (Simon de Burton) "y buylden a godelye chyrch from a patterne of St. Oswaldes Abbyes Chyrche, and dedicated MCCCL." 1387; the contract for the addition of five chapels on the south side of St. Giles's church, Edinburgh, states they are to be "voutyt on the maner and the masounry as the voute abovyn Sant Stevinys auter standand on the north syde of the parys auter of the abbay of the Halyrudehous the qwhylk patronne thay (the masons) haf sene": also "a wyndow with thre lychtys in fourme masonnelyke the qwhilk patrone thai haf sene"; BANNATYNE CLUB, *S. Giles's Church*, 4to., Edinb., 1859, p. 25. 1395, tomb for Richard II erected during his lifetime, after "le manere et fourme d'un patren eut fait, demeurens as ditz masons, desouth le seal de son tresoror d'Engleterre"; RYMER, *Fœdera*, vii, 796; NEALE, *Westminster Abbey*, 4to., Lond., 1823, ii, 111. John Dade of Witton, Norfolk, by his will dated in 1505, was buried in this church (Regist. Rix, fol., 314); he orders "that the old roofe of this church be taken down, the walls helped, and a new roof to be made after the patern of Little Plumstede; and, because I am not able to lede it, I wyll that it be redid and made at my coste"; BLOMEFIELD, *Norfolk*, iv, 42. *Cir.* 1509, master Pageny made "the patrone" which showed the moldings for the tomb of king Henry VII at Westminster, but was discarded: and a charge is made "for makinge the patrones in timber" for the images; NEALE and BRAYLEY, *Westm. Abbey*, 4to., Lond., 1818, i, 55. Nearly all the work connected with the Beauchamp Chapel, Warwick, and the tomb of its founder, was covenanted to be done according to patterns, some on paper: those for the images on the tomb are mentioned as of "timber", BRITTON, *Arch. Antiq.*, iv, 11-14.

"Those (houses) that were builded before the time of king Henry VIII, retain to these days the shew and image of the ancient kind of workmanship used in this land, but such as he erected after his own devise—do represent another manner of paterne"—; HOLINSHED, *Description of England*, fol., Lond., 1587, p. 195.

Among notices of such terms in French works are; -1447, the municipal officers of Béthune directed the painter Copin Doustre to make and paint "deux pourtraictures ou devises" of the intended design (p. 81). 1529, at Péronne, the mayor sent to the governor "le pourtraict" of the new work to be done; a term which occurs frequently (p. 138) in the text. 1540, "la devise et patron de la ville"; 1521, "une forme et figure de la ville et du chastel" (p. 140). 1517, the échevins of Béthune requested "un gel et pourtraiture en figure" of the boulevard of the porte de S. Pry: "ung nouvel patron et pourget" is also mentioned (p. 146). 1552, "le descin" made by Jacques Vannoy, engineer (p. 169), selon le descin qu'en bailleroit par

escript le Sr. Baptiste ayant charge de la fortification des villes de l'ile de France, etc. (p. 173); and "après plusieurs desseings par moy baillez": and 1589, Jehan Fayot, ingenyeur—six escus sol., pour avoir pourtraict le plan de ceste ville (Péronne), (p. 174); Fons-Mélicocq, *Les Artistes, etc.*, 8vo., Béthune, 1848.

Patterns for moulds for machinery should be made of well-seasoned wood. The most proper is clean mahogany; the common chestnut tree is equally good; white deal is most commonly used. Beech is very often used for the teeth of wheels, and being a close-grained wood, it may be made very smooth. The workmanship of wheel patterns should be such as to produce great accuracy, and a smooth surface, the former being essential to the good movement of the wheels, and the latter to make the patterns produce a good and clean impression in the sand. The millwright in making his patterns for a cast-iron wheel, has—to proportion it so that when the fluid metal is poured in the mould, it may cool in every part nearly at the same time; without due attention to this circumstance, if the metal in cooling contract faster in one part than in another, it will be apt to break somewhere. In all patterns for cast-iron, about $\frac{1}{8}$ of an inch to the foot should be allowed for the contraction of the metal in cooling; Buchanan, *Millwork*, 8vo., Lond., 1841, p. 124-8.

PATY (W.....), originally from Yorkshire, was a marble mason and sculptor, and practised at Exeter as an architect, where he designed the West of England fire assurance office, with a rotunda, copying the work of Sir J. Soane at the bank of England. In 1775, being then at Bristol, the settlement was left to him of the merits of the designs submitted by T. W. Attwood and — Palmer, for the new guildhall at Bath; he decided in favour of the former, but Attwood dying soon after, Thos. Baldwin was appointed, and the building completed by him in 1777. In 1784 Paty designed, at Bristol, the centre portion of the royal infirmary; also Park street, Berkeley square; and 1789-94 the church of S. Paul, Portland square; these were built by J. Hague, mason, to whom they are usually attributed.

PAU. The ancient capital of Béarn, and now that of the department of Basses Pyrénées, in the south of France, situated on the rivers le Gave, le Hédas, and de l'Ousse, over the former is an old but good stone bridge of 7 arches; there are four more bridges, and another crosses the deep ravine dividing the town. Between the castle and the *parc* or public terrace is a road having a handsome bridge of two arches over the high road. In the place royale was a statue of Louis XIV, destroyed during the revolution, and replaced 1843 by a bronze statue of Henri IV by Raggi, the bas-reliefs by Etex. The château was first erected in Xth cent. by the princes of Béarn; it continued their residence until the accession of Henry IV to the throne of France. It at present consists of a donjon, of four towers, and several buildings, forming an irregular pentagon; the donjon or brick tower of Gaston Phébus, comte de Foix, was founded by him about 1363, and with the towers and outer wall are supposed to be the oldest portions: a copy of the contract for erecting the tower, dated 1375, exists, and in it the count engages to provide the bricks or tiles from the tuileries de Pau: it is 115 ft. high, and was restored by A. Paccard. The tour Montaüset, supposed to have contained the oubliettes, is 80 ft. high, and for 40 ft. high had no opening until one was formed in 1793: seven or eight small dungeons are formed in the thickness of the walls; only the upper story had a window. The castle was much damaged at the revolution. The restoration of the interior was well carried out from about 1830 for king Louis Philippe by J. Latapie; the chapel dates 1843: the exterior was restored for Napoleon III chiefly after 1852. In 1868 — Lafollye exhibited a set of 14 drawings of the building, Daly, *Revue Générale*, 4to., 1868, xxvi, 74; who 1844, v, 240, 520; and 1853, xi, 90, notices the works. Eight plates by Lafollye, of plans and elevations, with two sections of the grand staircase having his name as architect, are given in Encyclopédie d'Architecture, 4to., Paris, 1873, ii, with a history p. 113 and 147, which gives the names, 1380, Picard de Lordat, architecte de Gaston Phœbus; 1557, Hervé Boulard, maître architecte;—, Odet de Lestang, maître des réparations des fortifications; 1565, Boulard again;—, cap. Claude Tinard, maître ingénieur, etc.; 1838, Lefranc et Abadie; 1852, Tétaz; 1855, Couvrechef; 1857, Ancelet; and 1864, Lafollye. One of the elevations is given in Building News *Journal*, 1874, xxvi, 200.

The old church of S. Martin was 1868 replaced by a new one in the style of the XIII cent.; that of S. Jacques is also of late erection. J. Latapie and A. Famin projected 1825 the church of S. Louis Gonzague; and the former restored the hôtel de ville; designed the market; the *halle* having the municipal offices, and a library of 20,000 volumes over it; the public granary 154 ft., by 220 ft.; and 1824 a bathing establishment 98 ft. 6 ins. long. In 1847-55 was erected the palais de justice; 1863 the prisons; and 1862 the theatre for 1,200 persons. A plan of a Roman villa over 80 ft. in length, discovered, with its pavements, April 1850, are given in Illustrated London News, xvi, 430-2. Melling, *Voy. Pitt. dans les Pyrénées françaises*, fol., Paris, 1840, pl. 1-3, gives the castle. Taylor, *Les Pyrénées*, p. 514. Lenglet du Fresnoy, *Méthode, etc.*, iv, 232. Piganiol; Moreri; Le père Lelong, *Bib. Hist.*; *Guide de l'Etranger à Pau, etc.*, 12mo., Pau, 1872, 5th edit.

In the new highway connecting the Gave de Pau with Saint Saveur, has been constructed the pont Napoleon, erected 1860-62 by his order, and formed of one arch 137 ft. 9 ins. span, with a total length of 217 ft.; and 16 ft. wide; the carriage way is 14 ft. 9 ins. wide, and each footway 2 ft. 9 ins. wide, being in great part carried on corbels. The roadway is nearly 215 ft. above the level of the dry season waters. The works cost about £12,745 under Scherer and Marx, ingénieurs des ponts et chaussées; Bruniquel, ingénieur ordinaire, being resident engineer. A section and the scaffolding are given in Engineer *Journal*, 1867, 364-6. 14. 28. 50.

PAUL, an Armenian; see Boghos.

PAUL. A monk of S. Stephen's abbey at Caen, a nephew of archbishop Lanfranc, became the first abbot (1077-93) of S. Alban's after the Norman conquest, and erected the abbey church 1077, consecrated 1115, of Roman brick from Verulam and of flint, in emulation both of S. Stephen's abbey and of Canterbury cathedral: Neale, *S. Alban's*, fol., Lond., 1878, gives the dimensions of the three buildings. He was succeeded by Richard de Albeneio, 1097-1119.

PAUL (meister) von Brandenburg, built 1488 the kloster at Neuruppin. 92.

PAUL (frère), a Franciscan; see Kourz (Paul).

PAUL (Sir George Onesiphorus, bart.), designed and superintended the erection of the gaol at Gloucester, opened 1791. It was intended as a reformatory, and consists of the penitentiary, bridewell, and sheriff's prison, with 203 cells, and a courtyard 210 ft. long and 57 ft. wide. Brayley and Britton, *Beauties, etc.*, 8vo., Lond., 1803, p. 553. It was carried out by J. Wheeler. Paul lived 1774-1820.

PAULET or Powlett (John), fifth marquis (1628) of Winchester, died 5 March 1674. He built about 1663 (after the demolition 1645 of Basing House, Wiltshire) that of Englefield House, Berkshire; given in Neale, *Seats*, 4to., Lond., 1828, iv, 2nd ser. Gerbier, *Counsel and Advice to all Builders*, 12mo., Lond., 1663, in the dedication to the marquess refers to "Henfielde House" as so called by him.

PAULITZA or Paulizza. A village in Asia Minor, representing the ancient Phigaleia; see Bassæ.

PAULLE (Pierre), is known by his tomb, which was in the church of the monks of l'Avé Maria, at Paris, and had the following inscription. "Here lies the noble man M. Pierre Paulle, called the Italian architect to our Lord the King, valet de chambre ordinaire of the said Lord, controlleur de ses bastimens, et concierge de ses chasteaux de Fontainebleau, Moulins, Bourbon-l'Archambault, who died 18th Dec. 1637. Priez Dieu pour son âme." Lance, *Dict. Biog.*, 1872.

PAULO (Fra Domenico di) of Florence; died 5 Oct. 1501.

PAULO (San), in Brazil; see Paolo (San).

PAUL TEAK. A brown coloured wood of Travancore, East Indies, used for furniture, gun carriages, etc. 71.

PAUSILIPPO; see Possilipo.

PAUTRE, also written Paultre and Pôtre. Jean le Paultre, maistre menuisier, and Adrien, menuisier, were both of Paris. The latter had two sons, Jean, born 28 June (1617 or) 1618, and died 2nd Feb. 1682 it is supposed; and Antoine, born 15 Jan. 1621 (1614 has been stated generally), the date of whose death seems unknown even to Jal; it is stated to have occurred 1682, and 1691; but in the copy of Lambert, *Hist. Litt.*, 4to., Paris, 1751, iii, 139, in the British museum, a manuscript note gives it so early as 1677, which is probable. Jean had two sons, Pierre and Jacques. Antoine had four brothers, two of the name of Jean, François, and Sebastien. There was also Pierre (i) son (or cousin) to Antoine, born 4 March 1660 (or 1659), ("about 1669 a sculptor", Blondel, p. 121), and died 22nd Jan. 1744, who was a sculptor and engraver; Pierre (ii), born 1682 and died 1699, also an engraver; Jacques, engraver, born ....., died 1684; Pierre, nephew to Antoine, born ....., died 1716: this P. and J. Le Pautre engraved many plates in Desgodetz, *Les Edifices Antiques de Rome*, fol., Paris, 1682; for Perrault's *Vitruvius*, and other works. Nagler also mentions Gabriel, an artist, died 1670. Full details of Jean and Pierre and their works are given by Destailleur, *Recueil d'Estampes relatives à l'Ornementation des Apartements aux XVI-XVIII siècles*, fol., Paris, 1863; and of the family by Jal, *Dict. Critique*, 8vo., Paris, 1867.

Antoine obtained a great reputation for the decoration of apartments; and Jean, more an engraver than architect, has left a great number of compositions, such as ceilings, chimney-pieces, vases, etc., which show a brilliant and fertile imagination. These two artists exercised great influence upon the style of the decorations which characterised the reign of Louis XIV.

PAUTRE (Antoine le), born at Paris 15th Jan. 1621, became *architecte et ingénieur ordinaire* des bastimens to the king, and comptroller general of the buildings to the duke of Orleans, of which office he was in possession 25 August 1658, as is proved by an order of that date: "To Antoine Lepaultre, architect in ordinary to the king, the sum of 1200 livres a year as his salary for the year 1655." His principal works are at Paris;—The hôtel de Beauvais, rue S. Antoine, now No. 62, for Pierre de Beauvais, conseiller ordinaire du roi (given in Blondel, *Arch. Franç.*, fol., Paris, 1752, iii, 121, with 3 plates, which are also given in Marot, *Arch. Franç.*, fol., Paris, 1727-51, pl. 42; the elevation in Blondel, *Cours*, 8vo., Paris, 1772, iii, 445; Cousin, *L'hôtel de Beauvais*): in July 1704 the inside was destroyed for the new mode; in 1706 the edifice belonged to Jean Orry, secretaire du roi, who made many alterations. The hôtel de Fontenay-Mareuil, rues Coquilliere and Coqueron, afterwards known as the hôtel de Gesvres, at the corner of the rues S. Anne and S. Augustin), as stated in his *Œuvres*, p. 19. Also the hôtel de Chamillart, rue Coq Heron: the hôtel for the chancelier de la Seiglière de Boisfranc, rue S. Augustin, which afterwards belonged to the duc de Trêmes: 1625 or 1646 the church des religieuses de Port Royal, rue de la Bourbe, faubourg S. Jacques (given at the end of his *Œuvres*; also engraved by Marot), and since converted into a foundling hospital; the maitre autel of the church of S. Laurent, rue du faubourg S. Martin; and the fountain S. Victor. As architect to the king he had to furnish designs for the château Clagny intended for Madame de Montespan, who not being satisfied with the design, employed Mansart. He built also for the king the hôtel des Gardes at Versailles, finished by Gallant, the inspector of the works. For the duke of Orleans he designed 1660 the two wings of the château de S. Cloud (designed by Girard), which still exist, and the upper part of, or commenced, the grande cascade (given in Baltard, *S. Cloud*, fol., Paris, 1803, p. 11-3): it was completed by J. H. Mansard. The château de S. Ouen, Ouyn or Ouyen, near Paris, was built for M. de la Seiglière de Boisfranc from his designs; but the duc de Gesvres, son-in-law of M. de la Seiglière, sold the land of S. Ouen in 1745 to Madame de Pompadour; it was pulled down 1816, and rebuilt soon afterwards by J. J. M. Huvé for Madame de Cayla: it is also stated that Huvé completed 1819-21 the château for the government as a memorial of the return of Louis XVIII, who herein gave the charter of the constitution. In 1657 he designed for the Jacobins of Lyons (or 1674 by J. le Pautre, as s.v. Lyon) a "*portail*", the execution of which was entrusted to an architect of that city. At S. Germain-en-Laye, he designed a hôtel for the comte de Lauzun, as appears from a letter of Louvois' published in *Les Archives de l'art Français*, ii, 2nd series. Antoine was one of the eight original members of the academy of architecture on its establishment in 1671. He died at Paris in 1677, as stated above, ("aged 77 years in 1691" as stated by Nagler and d'Argenville). 5. 112.

He published *Œuvres d'Architecture, Dessins de plusieurs palais, plans et élévations en perspective géometrique, ensemble les profils élevés sur les plans*, 63 pl., fol., Paris, (1652), which contains his portrait, and is without letter-press: the second edition 1710, but also dated 1652, and bearing the address of Jombert, has 38 pages by d'Aviler. Longlune was a pupil. P. de la Grave, *Des Maisons Royales.* Blondel, *Cours d'Arch.*, 8vo., Paris, 1772, iii, 444. Dulaure, *Env. de Paris;* Piganiol, *Arch. de l'art franç.;* Brice, *Nouvelle desc. de la ville de Paris*, 8vo., Paris, 1725, i, 366; ii, 164; iii, 129. Le Bas, *Dict. Encycl. de la France.* Dezallier d'Argenville, *Vies*, 8vo., Paris, 1788, i, 396. Lance, *Dict. Biog.*

PAUTRE (Pierre le), architect and engraver to the king, was a nephew of Antoine. He published *Les Plans, coupes, profils, et élévations de la Chapelle du chasteau royal de Versailles*, fol., Paris, n. d.; also *Château de Versailles*, Plans, profils, et élévations de la ville, avec les bosquets et fontaines, 56 plates of fountains, fol., Paris, 1714-16, and is very scarce: besides a number of designs, including *Cheminées et Lambris à la Mode executez dans les nouveaux Batimens de Paris*, 6 pl. He died in 1716.

PAUTRE (Jean le), the celebrated *dessinateur et graveur*, born 28 June 1618, was a pupil of Adam Philippon, menuisier et ingénieur du roi. He was elected 11 April 1677 member of the académie des beaux arts at Paris, and engraved from about 1641 to about 1680 some 54 or more works, mostly undated, containing about 1440 pieces of ornament, without the mythological and other subjects, according to the catalogue of P. Mariette. He is supposed to have died 2nd Feb. 1682; and published *Œuvres, contenant une grande Collection d'Ornements;* Vases, Cartouches, Sepultures, Clostures, Chapelles, Mausolées, Tabernacles, Autels, Tombeaux, Ornemens de paneaux, Portes, Jardins, Parterres, Façades, Grottes, Fontaines, Trophées d'armes, Frises, Feuillages, Lambris, Plafonds, Bordures, Termes, Escussons, Cheminées, Alcoves, etc., 3 vols., 776 pl., fol., Paris; which is scarce. Another copy having 785 pl. had the date 1751. Decloux et Doury, *Collection des plus Belles Compositions de le Pautre*, 100 pl., fol., Paris, 1854. There is an engraved portrait of Jean, by himself, dated 1674; and an oblong plate of Jean after Mariette, and of Antoine by P. Lelong.

PAUTRE (Jacques le), probably son of Jean, engraved *Livre de Serrrevie*, 12 pl., fol., Paris (1690 ?).

PAUWELS (Gilles), architect to Philippe le bon, appears to have made many journeys to Louvain to revise M. de Layens' design for the hôtel de ville in that city, commenced 29 March 1448; Echo de Louvain *Journal*, 7 May 1848; Schayes, *Hist. de l'arch. en Belgique*, 8vo., Brux., (1850-3), iv, 39. 98.

PAVAUGHUDD; the modern name of Chapaneer. A large mountain or rock rising nearly perpendicularly about 2,500 ft. above the plain, north of Baroda, in Guzerat, in Hindustan. At its northern foot are the remains of an ancient city, the ruins of which, consisting of houses, temples, tanks, mosques, etc., extend several miles on each side of the mountain, and are covered by jungle. On the southern side the ruins extend four miles

from the modern city. The mountain is fortified; an upper fort, thought to be impregnable, contains a famous Hindoo temple of great antiquity dedicated to the goddess Kalee or Kalla: the lower fort is also extensive. The town was taken and destroyed A.H. 889, by Mahmoud, the seventh (or sixth) king of western Guzerat, and again by Humaioun, emperor of Delhi, A.H. 941, A.D. 1528; it afterwards fell into the hands of the Mahrattas; was lastly taken from Sindiah in 1803 by the Bombay army under col. Woodington, and in 1804 returned to Sindiah. MILES, *Account*, 1812, read to and printed in LITERARY SOCIETY OF BOMBAY, *Transactions*, 4to., Lond., 1819-23, p. 140-5.

PAVEMENT, or paved way, often called PAVING (Lat. *pavimentum*). A covering formed of various materials wherewith to give a more durable surface to a softer one, being either a natural or a made ground, whether to be used for animal, carriage, or foot, traffic. Pavements adopted for the latter purpose only, are herein considered; the others may be noticed s. v. STREET and ROAD. The term FLOOR comprises a surface usually above a soil level and inside a building; it is of wood where warmth and comfort are required; stone, marble and tiles being of a cold nature; the elephant in the zoological gardens at Hamburgh died of "cold feet", occasioned by the substitution of stone for the wood floor to which he had been accustomed. He refused to lie on it and had to take his rest standing; BUILDER *Journal*, 1875, xxxiii, 308. A paving stone has been found raised by the force of the growth of fungi; same *Journal*, 1864, xxii, p. 795.

As regards the pavement in ancient temples wherein rain must occasionally have penetrated, it will be found that the central portion of the *cella* in the Parthenon is depressed about 3 ins. below the level of the remaining portion of the pavement in order to convey away the water towards the door. A similar sinking appears in the pavement of temple at Phygaleia. In the Pantheon at Rome, the pavement is inclined towards one point, so as to carry off the water: and according to CAVALLARI, drain-pipes for this purpose were found in more than one Sicilian temple. FALKENER, *Dædalus* (in one of the two tracts issued by him). Slabs of sawn marble were used in the temples.

Three sorts of Roman pavements are described by VITRUVIUS, vii, 1; I, on the ground itself; II, timber floors, that is, beams of timber carrying rough rubble and finer stuff on which is laid the pavement, whether of slabs or tesseræ; or Tiburtine tiles: and III, the same for the open air, but made with more care, and finished with tesseræ about 2 ins. thick; with much greater care the preparation is covered with tiles 2 ft. square, properly jointed, having small channels of the size of an inch cut on the edge, which are filled with lime tempered with oil, and the edges rubbed and pressed together, and then finished with large tesseræ or angle tiles: the pavement in both these cases being laid with a fall of 2 ins. in 10 feet. VITRUVIUS, vii, 4, also describes the formation of the floors or pavements used in the Grecian winter-rooms, or triclinium. All the above were for household purposes. For the ancient Roman methods of forming similar pavements, see PAVIMENTUM OR OPUS, BARBARICUM; INCERTUM; LITHOSTROTUM or stone mosaic; SIGNINUM; SUBTEGULANEUM; SUBDIALIA; SECTILIA; TESSELATUM or clay mosaic; VENEZIANO; VERMICULATUM; ALEXANDRINUM and GRÆCANICUM, in which last is described the formation of the various sorts.

GILBERT, in *Revue Archéologique de Paris*, edited by Leleux, i, p. 188, gives *Le pavage de la ville de Paris depuis l'époque Romaine jusqu'à nos jours. Histoire du pavage des églises—en Normandie, en Picardie et en Champagne*, in DALY, *Revue Archéologique*, 1847, vii, 533; 536-8.

"In no monuments or constructions (in Belgium) of a later date than the Roman era, are found any vestiges of mosaic pavements composed of small cubical stones; but from the XIth and XIIth centuries pavements were made of a chequered work of small stones, triangular, square, or oblong, covered with a metallic enamel, as black, green, or yellow, of great brilliancy. The apartments in large hôtels, the refectories of abbeys, chapter houses, etc., were paved in this manner, either with small tiles of enamelled clay, two or three inches in diameter; or of tiles the size and shape of modern ones, some enamelled and covered with various ornaments or inscriptions; others retaining the natural colour of the brick, but ornamented with inlaid cement. The crypt of the abbey church of S. Bavon still has a pavement of this kind, very rich and varied in design; and in clearing away the ruins of the abbey of S. Michel at Antwerp, burnt 1830, the pavement of the crypt was found made of small triangular tiles enamelled in green and yellow. The large squares of marble or *pierre bleue*, as now used, may have been used for churches and other buildings in the Roman period; SCHAYES, *Histoire, etc.*, 12mo., Brux., (1850-53), ii, 49.

London was not paved at the end of the XIth cent. Several of the principal streets, as the road between S. Giles and Temple bar, were paved *temp.* Edward III; Holborn, for the first time in 1417; others under Henry VIII; some in the suburbs in 1544, others in 1571 and 1605, and Smithfield market in 1614. An act was passed 1532-33 for paving the streets of London. In 1662 supervisors were appointed by Parliament for repairing the highways and sewers. The Westminster Paving Act, passed 1762, was the first great metropolitan street reform: before which each inhabitant paved before his own door in such manner and with such materials as pride, poverty, or caprice, might suggest: kerb stones were unknown. BECKMAN, *History of Inventions*, etc., 8vo., London (Bohn), 1846; revised edit. The gross area of the public footways in the City of London was given in 1867 as 309,018 square yards.

Every roadway should have one footpath, not more than 9 ins. higher than the bottom of the side channels, and the surface should have a pitch of 2 ins. in five feet towards them. When the natural soil is firm and sandy or gravelly, its surface will serve for the footpath; but in other cases the natural soil must be thrown out to a depth of 6 ins., and the space be filled with fine clean gravel or concrete. The side slope of the path next the channel must be protected by an edging of stone, as a kerb, or be faced with good sods. Pavements of freestone, etc., should be laid on a dry bed. Those of courts, stables, and passages usually on a mortar of lime and sand, or of lime and cement. For ground floor apartments they should be laid on piers, or dwarf walls, for dryness.

The various sorts of pavements for foot traffic are the following: those printed in capitals are treated in this work under their headings.

Earth well rammed. GRAVEL. FLINT.

Trotter bones. A pavement at Oxford, about 200 years old, is noticed in BUILDING NEWS *Journal*, 1869, xvii, p. 199.

PEBBLE, shingles, cobbles, or boulders; such as are collected from the sea beach at various places.

RAG, from the Ragstone; it is inferior to the pebble. KENTISH RAG.

PURBECK pitchers. Square stones from 6 to 10 ins., and 5 ins. thick.

WHINSTONE pavers. *Squared paving*, also called *Scotch paving;* formed of a clear close stone called *blue wynn;* this is now obsolete.

Brick (Fr. *carrelage*). This material is generally used for the paving of vaults, cellars, and passages; in country places it is also used for footways of pavement. Grey stock bricks, or red bricks, are used in London, or, which are better, those made for the purpose, called *paving bricks.* Such bricks are laid upon well rammed ground, either on their flat surface (A), or on edge (B). It is best to lay them dry and afterwards to grout them with lime and sand; or with sand only.

(A) 36 bricks per sup. yard laid flat 9×4 ins. $= 36$ ins.
(B) $60\frac{4}{8}$ „ „ on edge $9 \times 2\frac{3}{8}$ ins. $= 21\frac{3}{8}$ ins.

A Paving brick is $9 \times 4\frac{1}{2} \times 1\frac{3}{4}$ ins.; hence

32 bricks per sup. yard laid flat $9 \times 4\frac{1}{2}$ ins. $= 40\frac{1}{2}$ ins.
82 „ „ on edge $9 \times 1\frac{3}{4}$ ins. $= 15\frac{3}{4}$ ins.

32 and 48 are stated in WOOD, *Cottages*, 1788.

A bricklayer and labourer in 1747, in the common course of working, would lay 750 bricks flat per day, the ground being ready for them.

In 1786, bricks for paving cellars, hearths, sinks, etc., were described as $8\frac{1}{2} \times 4 \times 2\frac{1}{2}$ ins.; 100 of which would weigh about 550 lbs.; and 407=1 ton weight. 30 or 32 used flat would pave a yard square; if on edge, about twice the number; CHAMBERS, *Dict.*

(C) *Herring bone*, also executed as above, but the bricks laid diagonally: also in patterns as a sort of mosaic.

(D) *Bricks laid endwise*; also as above.

(E) *Clinker pavement.* A pavement formed of clinker bricks. The ordinary clinker brick is one that has much nitre or saltpetre in it, which with the violence of the fire runs and glazes them. Another variety is where two or three of them have run together in the burning, and thereby are very hard. CLINKER. DUTCH CLINKER. FLEMISH BRICK.

(F) Blue vitrified adamantine paving for a shed, platform, stable, yard, wash-houses, etc. Staffordshire vitrified blue bricks. Stable bricks. Terra metallic paving.

TILE. Of various sizes and manufacture; (A) the commoner sort, as 4, 6, 8, 10, and 12 in. or foot, tiles used for the pavement of washhouse, dairies, country kitchens, etc. Vitrified for stables. (B) The embossed, encaustic, or glazed tile, used in ecclesiastical and civil works, ancient and modern.

(C) *Diamond* paving. Tiles set diamond fashion.

GRANITE is not much used; when worn it becomes very slippery. On London, Waterloo, and Southwark bridges, it is laid down in large thick slabs, which have periodically to be scabbled (or picked) to render them safe.

PURBECK. The blue sort is the best, and is obtained in fairly large surfaces, and about $2\frac{1}{2}$ ins. thick. FLAGSTONE.

MANX FLAGS; and POOLVASH.

Arbroath; CAITHNESS; and YORKSHIRE, flagstones (Fr. *dalle*). Esteemed materials, obtained of various qualities, and of large dimensions. FLAGSTONE. FORFARSHIRE STONE. Caithness stone $1\frac{1}{2}$ in. thick with sawn joints was recommended to Yorkshire stone 3 in. thick, by J. Newlands, borough surveyor of Liverpool, in *Report*, published in CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 279. *Irish flags. Welsh flags.*

Reigate, Ryegate, or firestone. It is used for hearths, stoves, ovens, and other places subject to great heat, by which this stone, if kept dry, is not affected. FIRESTONE. GATTON. GODSTONE. MERSTHAM. REIGATE.

Newcastle flags, used in paving of kitchen offices. They run about 2 ft. square, and $1\frac{1}{2}$ to 2 ins. thick, and bear considerable resemblance to the Yorkshire stone; but are not now much used.

PORTLAND. Stone obtained from the island of Portland, of almost any required dimensions. The squares when laid down in halls, are sometimes rendered more ornamental by cutting the angles and inserting a black square of stone or marble, which is thus set diagonally to the others.

CARLOW FLAGS. CRAIGLEITH STONE. GRANITIC BRECCIA. HOPTON WOOD STONE. ROCKHILL. SILICATED STONE. VICTORIA STONE.

Marble. Of very many sorts. The pavement of the Beauchamp chapel, Warwick, was laid 1457 in white and black diagonal squares according to the contract "in pieces of 2 ins. thick and of a convenient breadth". That of Henry VII's chapel is also in diagonal squares of black and white marble, laid down about 1699. LANGLEY, *Treasury of Designs*, 4to., Lond., 1739; 1750, gives pl. 94-105 various patterns for marble pavements. CARWITHAM, *Various Kinds of Floor Decorations, represented both in Plans and Perspective*, for Floors of Halls, Rooms, Summer Houses, etc., whether in Pavements of Stone or Marble, or with Painted Floor Cloths, 24 plates, 4to., Lond., 1739. The marble pavements in Sta. Anastasia at Verona, are slightly shown in STREET, *Brick, etc., Arch.*, 8vo., Lond., 1855, p. 78; and others noticed s. v. MARBLE DECORATION.

(A) INLAID WORK of marble. Black or very dark green marble or cement inlaid in white marble; *Illustrations* s. v. Pavement, 1848-49, pl. xxi. It is peculiar to Tuscany; Lucca, duomo from 1308; Florence (baptistery work dates 1288-93), that in S. Miniato dates probably from XI cent.; Pisa; Pistoia; and Siena, where the example in the duomo is the most celebrated work of this class. WARING and MACQUOID, *Arch. Art in Italy, etc.*, fol., Lond., 1850, pl. 5; 43. ALEXANDRINUM OPUS. *Illustrations*, s. v. Marble pavement, 1861, pt. 1; Inlaid pavement, 1848-49, pt. 2, pl. 21. GRÆCANICUM OPUS. FLOOR; INLAID.

(B) *Incised slab* and pavement; BURGES, in BUILDER *Journal*, 1850, viii, 304-7, and plate. INCISED WORK.

Terrazzo Veneziano. GRUNER, *Specimens of Ornamental Art*, fol., Lond., 1850, pl. 29, etc. C. H. Wilson, *Venetian paving*, in CIVIL ENGINEER, ETC., *Journal*, 1841, iv, 37.

TESSELATED, or MOSAIC. TESSERÆ. "Marble mosaic" and "Roman mosaic" are now much in vogue for passages.

BROU. OTRANTO, 1163-5. OTRICOLI. Museum at YORK. PALERMO. SALZBURG. PALESTRINA. POMPEII. BRESCIA, (GRUNER, *Ornamental Art*, pl. 27). NOVARA. SIENA. MANTUA. MURANO, 1140. ROME. NAPLES (p. 11*b*). VENICE. ALCATIFA. BRUGES. ITALICA.

TERRA COTTA, as at the Laurentian library at Florence: and perhaps in S. Petronio at Bologna. MOSAIC WORK (p. 127).

Glass. Thick sheets, called patent rough plate, are set in floors, area gratings, etc., for the transmission of light to the apartment below, and form a firm bearing as a pavement.

Iron has probably not been used for a footway, though it has been for a ROADWAY, and failed.

SLATE flags, as from the quarries at Festiniog, North Wales, present a cheap and admirable pavement, and in slabs so large as to prevent much chance of an irregular surface being produced when much used. At the transept entrance of the Exhibition Building 1851 some millions of footsteps failed in producing any mark of unequal wear.

Sweedland. A black slate dug in Leicestershire and useful for halls or for particoloured pavements. The black small square pavement stones used in S. Paul's cathedral were obtained from Dutch ports; perhaps quarried near Namur.

WOOD.

PORTLAND CEMENT. "Wilkinson's concrete pavement" and floors for stabling, sheds, stores, cattle sheds, yards, warehouses, workshops, markets, etc.; it is said to be impervious to damp, not affected by frost, and to have no smell. A granite-faced quality is used for public footpaths and platforms in railway stations; and at the Guildhall museum, London; etc. A long advertisement was issued with the 4th Jan. number of BRITISH ARCHITECT, ETC., *Journal*, 1878. Dove and Co.'s "cement concrete flooring", is used for similar purposes.

PLASTER; composed of lime and coal ashes. BARN FLOOR.

LAVA. Streets paved with lava, having deep ruts for the wheels of carriages, and raised footpaths at either side, were discovered both at Herculaneum and Pompeii. ORSI AND ARMANI'S METALLIC LAVA. The Seyssel and Metallic Lava Asphalte Co., "The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, terraces."

TAR, and *tarred gravel*, for footpaths, playgrounds, platforms, etc.

Asphalte and BITUMINOUS CEMENT, for footpaths and floors. It was first used in England at Manchester in 1845; BUILDER *Journal*, 1845, iii, 263; but also for platforms in 1843 at Messrs. Pickford's, Wood Street, London. Polonceau and Seyssel Asphalte; and Val de Travers asphalte; for covering flat roofs, paving and flooring of every description, especially in places subject to damp and vermin, and for paving stables. W. HAYWOOD, *Report* to the Streets committee of the hon. the commissioners of sewers of the city of London upon granite and asphalte pavements, 1871; reprinted in BUILDING NEWS *Journal*, 1871, xx, 334; 357; 414; 439.





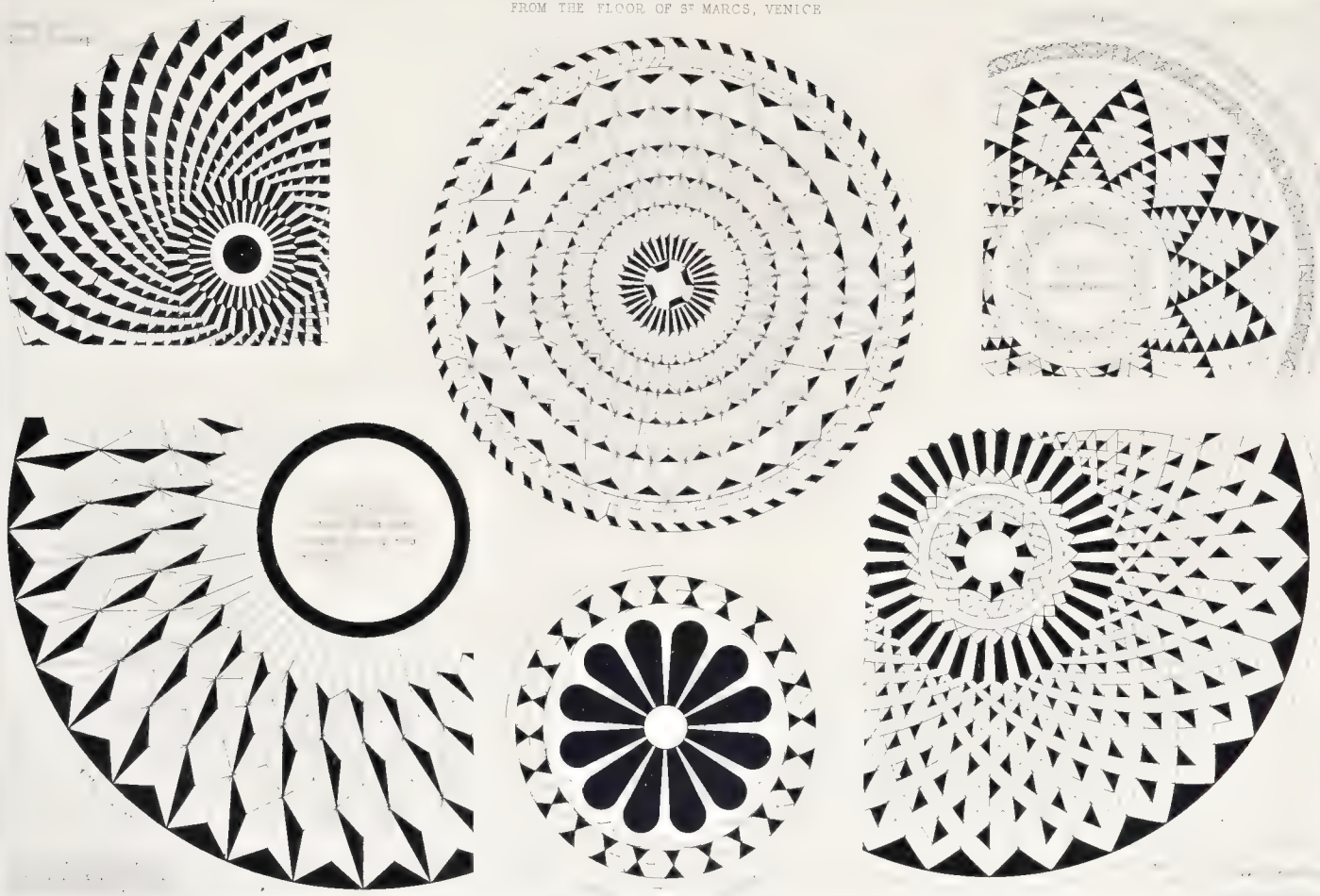






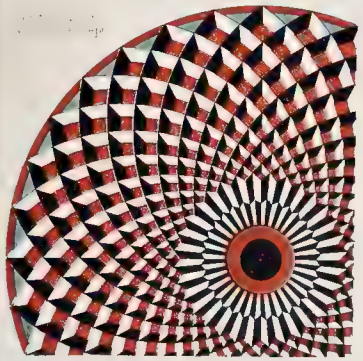
MARBLE PAVEMENTS

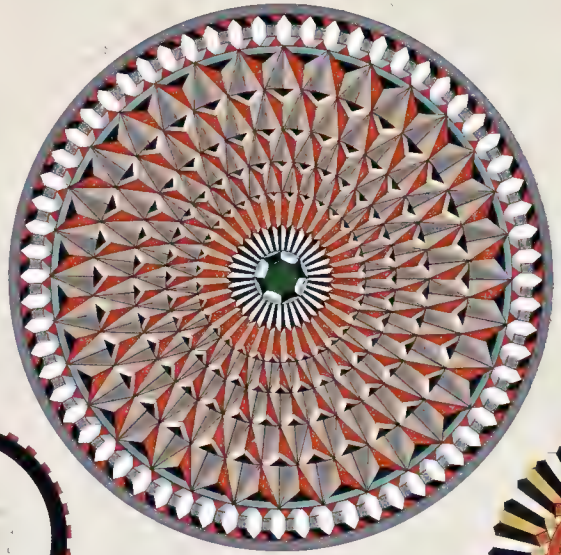
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MARBLE PAVEMENTS







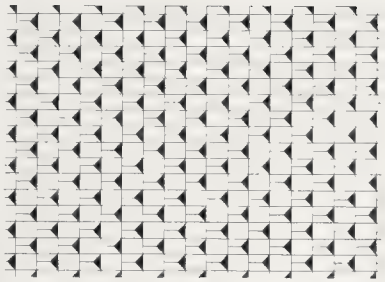


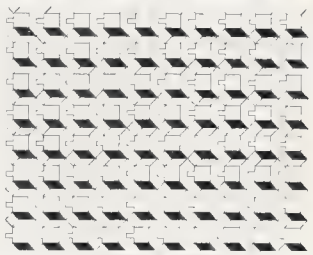


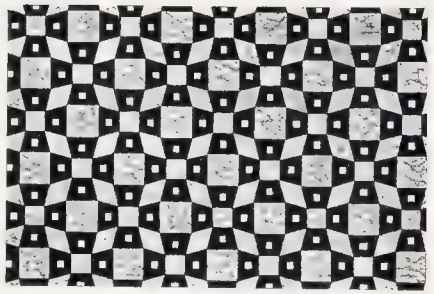


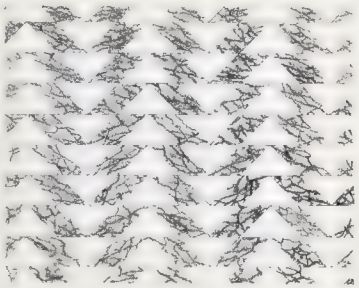
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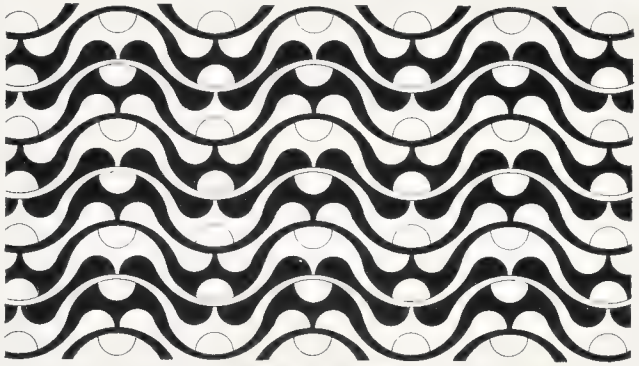
MARBLE PAVEMENTS.

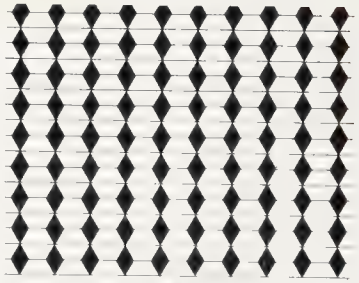


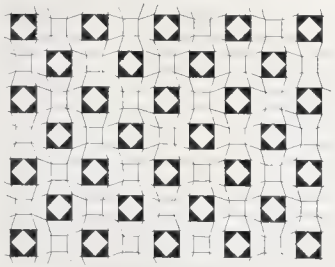


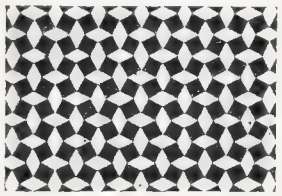


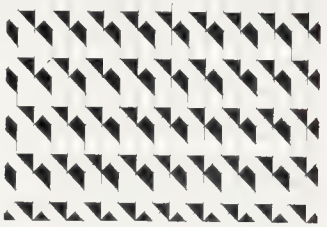






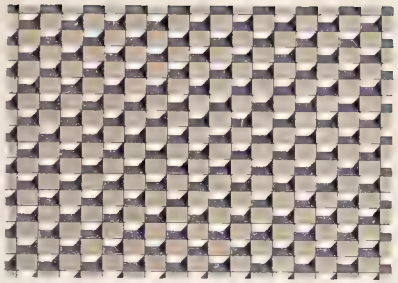




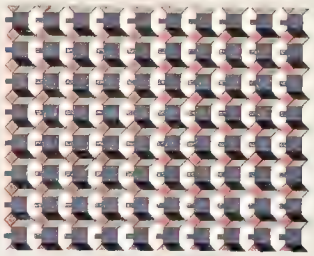


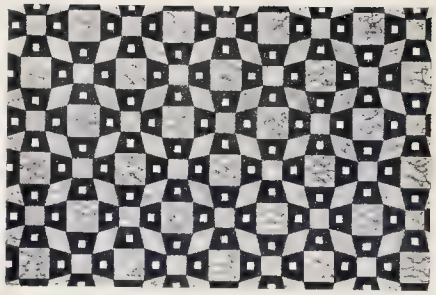
Lithographed for the Society by Vincent Brooks Chandos St Covent Garden March 31st 1862

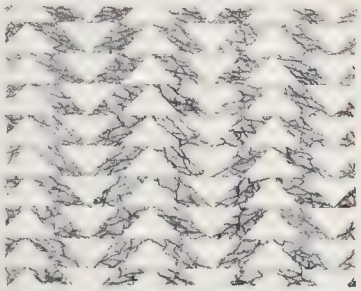
MARBLE PAVEMENTS.

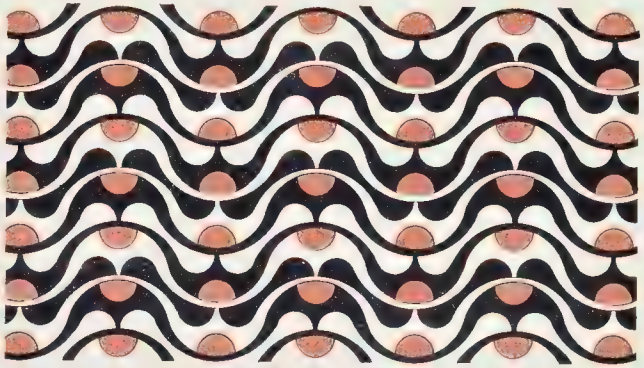


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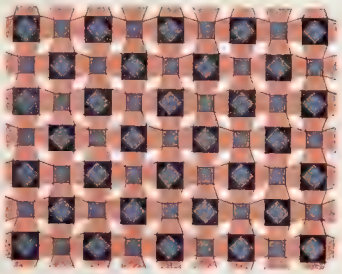




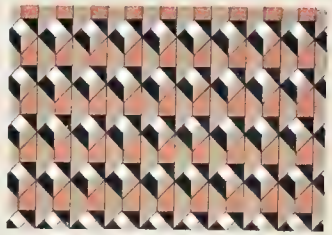












9


SALVE

X. Y., *Eight Letters concerning the Pavement of the Metropolis and Turnpike Roads*, 4to., Lond., 1817. DEYKES, *Considerations on the Defective State of the Pavement of the Metropolis, etc.*, 8vo, Lond., 1824. RENNIE, *Different modes of Paving described*, as Granite blocks, M'Adam's system, Wood blocks, Asphalte, and Flags, in INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1846, v, 67-8. HAYWOOD, *Answers to Questions of the Metropolitan Sanitary Commission upon the subject of Pavings*, 8vo., Lond., 1848. MITCHELL, *A New Mode of Constructing the Surface of the Streets, etc., of London, etc.*, 8vo., Lond., 1870, 2nd edit. WILLIAMSON, *The Natural History of Paving Stones*, in BUILDING NEWS *Journal*, 1871, xxi, 210; 231; 256, from "Science Lectures for the People." LAW, *Construction of Roads and Streets*, revised by D. K. CLARK, with *Recent Practice—of Stone, Wood, and Asphalte*, 12mo., Lond., 1877.

PAVEMENT LIGHT. A glazed grating set in the pavement of a street. J. H. Johnson patented the construction of frames or gratings intended to receive glass for the purpose of forming illuminating roofs, coverings for areas, and walking surfaces for side walks, when light is required to be transmitted through them. It consists of grooves or channels and perforations in rows, to facilitate the subdivision of the gratings into separate smaller sections; and for making the glasses in such a way as that the glass itself shall in a measure act as the medium for protecting its surface from being scratched by the feet of the passengers; BUILDER *Journal*, 1871, xxix, 709. Besides the ordinary gratings filled in with oblong panes of rough plate glass, there are Hayward's patent "hexagonal and rectangular semi-prismatic reflecting lenses"; and "prismatic lenses": Hamilton's patent "prismoidal lights": Hyatt's patent "lens for pavements"; patent "improved 5 lens illuminating platform"; patent "improved 7 lens" ditto; and "newly invented safe-walking stone face illuminating gratings".

PAVER. A malm brick, burnt in a clamp, rather harder than those necessary for house fronts of a good description. BRICK (p. 140).

PAVIA (Roman Ticinum), called Pavia la dotta, and "city of the hundred towers", the capital of the Lombard kings. A city situated in Northern Italy, on the river Ticino, over which is a covered bridge erected 1351 by G. da Ferrara; it has 7 (or 8) pointed arches of marble (or brick), each about 63 ft. (or 70 ft.) span and 62 (or 64 ft.) rise; the roof is supported by 100 granite shafts; SARAINA, in BARUFFALDI, *Continuazione*, etc., 4to., Fer., 1811, p. 97). The city abounds in old houses; GRUNER, *Terra Cotta*, devotes 4 plates to parts of them, and pl. 48 to the upper portion of a campanile. Three of the (supposed 525 ?) towers remain, which though lowered are still from 200 ft. to 250 ft. high (those of Belcredi and Maino are said to be about 190 ft.); they are square with small apertures all the way up; and are now supposed to have represented nobility or dignity, similar to those at Bologna. The Roman bronze equestrian statue, the only one besides that of Marcus Antoninus that had remained to modern times, called the Regisole, and supposed to have represented the emperor Lucius Verus, no longer remains. The *castello* 1460-69 for Galeazzo Visconti, who is said in a fit of anger to have hanged the architect, is a quadrangle, but one side was destroyed in the siege of 1527; it is now used as barracks. In the court is a double arcade, the upper one having moulded brick arches. The great gateway is still a fine object. The plan, elevation, etc., and two of the sides of the court, are given in GRUNER, *Terra Cotta Arch.*, fol., Lond., 1865, pl. 13-5: and plans, etc., in GAILHABAUD, *L'Arch. du Vme.*, etc., 4to., Paris, 1858, iii, six plates.

It is the see of a bishop. Three of its largest and finest churches, and 40 (or 47) other sacred edifices, were demolished by the French and at a later time. The *duomo*, dedicated to S. Stefano, was commenced 1488 (Renaissance) on a plan by Bramante LAZZARI, but continued after 1490 on a different design by C. Rocchi; G. A. Omodeo worked with him, and F. di G. Martini was consulted about the works. Sculptures on the side represent the ceremony of laying the first stone of the rebuilding, which are described in MILLIN, ii, 19. The PENNY CYCLOPÆDIA states "the church was rebuilt in the last (*i.e.* XVIII) century"; it was being restored 1854. Its plan is an enormous octagon without a dome; a *scurolo* is formed under the choir. In a side chapel is the magnificent tomb of S. Augustin (died 430), brought 1832 from the church of S. Pietro Cielo d'Oro; it is considered by CICOGNARA to have been the work of Pietro Paolo and Jacobello of Venice; VASARI assigns it to Agostino and Agnolo da Siena, which it could not be, if the date of the tomb be 1362 as stated in the books of the priory; ("it bears the date MCCCLXII", WEBB). MALASPINA, *Memorie storiche della fabbrica della catt. di Pavia*, fol., Milan, 1816. MALASPINA, *Lettera intorno alla Catt. de P.*, 8vo., Milan, 1832. VALERY, *Voyages en Italie*, 8vo., Paris, 1838, i, 200. BOSISIO, *Catt. di P.*, 8vo., 1858.

The church of *S. Michele*, consecrated before 661 (G. KNIGHT); of the VIII cent.; burnt 916 and 1004 and rebuilt; or of XI and XII cents. (LION), is of great interest (Lombard Romanesque). It is 189 ft. long, 81 ft. wide, the nave alone being 45 ft. wide. It has stone groining which is of later date. The *scurolo* under the choir having seven arches, is perhaps of X cent., and is peculiarly curious (plan in FONTANINI, *De Corpore Santi Aug.*, p. 37; which also gives the tombs of Luitprand, Boece, and S. Augustin); access to it is gained on each side of the steps to the choir, under the high altar of which is a mosaic pavement considered to be of the original erection. C. DELL' ACQUA, *Basilica di Sta. M. Maggiore*, 9 pl., 4to., Pavia, 1862. HUBSCH, *Alt. Kirchen*, fol., Carls., 1861, pl. 53-4; and *Monts. de l'Arch. Chrét.*, fol., Paris, 1866. G. KNIGHT, *Eccles. Archit.*, fol., Lond., 1843, pl. 13 and 14, gives interior view and portal; and pl. 15 the apse. ROSENGARTEN, *Architek. Stylarten*, 8vo., Brauns., 1857, p. 189; 191, plan and int. view. HOPE, pl. 32, west façade; also in CAPSONI, ii, pl. 2. DU SOMMERARD, *Album*, ser. 3, pl. 5, door; and the outside of the apse with details of early sculpture, ser. 8, pl. 6. D'AGINCOURT (Architecture), pl. 24, Nos. 15 and 16; and (Sculpture) pl. 26, No. 5. MOYEN AGE MONUMENTAL, pl. 66 and 117. MILLIN, p. 21-7. *Sta. Maria del Carmine*, also called *S. Pantaleone*, 1325-73 (Pointed Lombard, akin to English Gothic), in the finest brickwork, hard glazed and of a red tint; a large rose west window, the arched window heads, a round window and two lancets to the short square-ended chancel, are all formed in moulded terra cotta. At the south-west corner is a tall tower, square and panelled with a tile spire having a sort of open story on the top. The front, a part and details and the campanile, are given in GRUNER, *Terra Cotta Arch.*, fol., Lond., 1865, pl. 7-11. West front in STREET, *Brick, etc., Arch.*, 8vo., Lond., 1855, p. 206. *S. Francesco*, XIV cent., of same style and material; part of the façade in GRUNER. West end in STREET, p. 208; and HOPE, pl. 93. *Sta. Maria di Canepanuova*, begun 1492 for Giov. Galeazzo Sforza (died 1494), by Bramante, is a fine building. *S. Pietro Cielo d'oro*, built for king Luitprandus, who began to reign 712, is almost the counterpart of S. Michele, it has the usual octangular cupola; only some ruined portions now remain; the interior, modernised, was long used for a barn; GRUNER, pl. 2: apse in G. KNIGHT, i, pl. 16. *S. Teodoro*, of same date, has a like cupola; interior much modernised; apse in G. KNIGHT, i, pl. 16. *S. Marino*, IX cent., has had the interior much modernised. *S. Eufemia*, of XI cent.: the apse (Italian Gothic) is given in GRUNER, pl. 1. The west front of "the church of the Augustines", is given in HOPE, pl. 50: *S. John in Burgo*, VII and VIII cents.; D'AGINCOURT (Architecture), pl. 45; and pl. 64 and 73 the portail: *S. John Baptist*, an early cross church with centre apse, and a nave of five bays; a figure in relievo of a bishop on the front; Kerrich collection, Brit. Museum, *Addit. MSS.*, 6759, fol., 125; 6728, fol. 10, these three are perhaps destroyed.

The university, founded 774, reformed 1390, has fine colonnades and a good staircase with high vaulting; and five courts,

in which are tombs, etc., of early professors, removed from the destroyed churches: the library consists of over 50,000 volumes; the anatomical theatre is well contrived: the building was renovated 1779 and 1787, and two new quadrangles built 1816; the principal façade is by — Marchese. The collegio Borromeo, by P. Pellegrino (Malaspina, 105), founded 1563 by S. Carlo, has a magnificent court of two stories; and the collegio Ghislieri, upon the works at which M. Bassi was consulted, and in front of which is a bronze statue of its founder, pope (1566-72) Pius V. The museo Malaspina was founded 1838. The hospital of S. Matteo is a very magnificent erection. The theatre, about 1773, in strada Nuova, near the porta di Milano, was by Antonio Galli Bibiena; the interior is decorated with black marble.

Cordero, *Dell' Italiana Archit., etc.*, 8vo., Brescia, 1829, p. 36-8, does not allow of any buildings in Pavia older than 1004. Stefano, *Istoria dell' Antichità, etc., di P.*, 4to., Pavia, 1570. Lomellini, *Storia—e del principato di P.*, 4to., 1756. Capsoni, *Memorie Storiche di Pavia*, 4to., P., 1782. Malaspina, *Guida*, 8vo., P., 1819. Robolini, *Notizie appartenenti alla storia.* Ghisoni, *Flavia Papia.* Voghera, *Monumenti Paresi*, 1829. Webb, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 223-30. Hope, *Hist. of Arch.*, 8vo., Lond., 1835. 14. 28.

Outside the city is the church of S. Lanfranco (good Lombard Romanesque); S. Salvatore, a good specimen of an Italian church (Woods, *Letters*, 1828, i, 222), and another church by P. Pellegrino, the outside never finished; the inside has two orders. Five miles distant is the celebrated *certosa* della beata Vergina della Grazie, founded by Giovan' Galeazzo Visconti, first duke of Milan (who is represented in a panel of the door) with the buildings for 25 Carthusian monks. The foundation was laid 8 Sept. 1396, the architect is unknown, but is said to have been Jacopo or Marco di Campione (supposed the same person as Marco da Frisone), or Heinrich Arhler of Gmuenden, architect to the duke's duomo at Milan; but it is lately (1878) attributed to Bernardo da Venezia (*Handbook*): but s. v. Campione, it is stated that the church was erected 1378-1402 by him with Niccolo da Selli (perhaps Niccolo di Piero Lamberti, or Niccolo d'Arezzo, died 1417); a bust in the lavatory is supposed to be that of the architect, but it is without name and date. G. B. Caporale was employed about 1550. The monks were expelled 1782 and the building closed 1810; it was reopened 1843; and on the general suppression of monasteries in Italy ten monks only were retained. The building is now much in ruins. The arched gateway or vestibule, about 80 ft. 9 ins. long and 29 ft. 3 ins. wide, is given with its decorations in Gruner, *Fresco Decorations*, 13 plates, fol., Lond., 1844. Beyond is the quadrangle about 135 ft. by 400 ft., at the end of which is the richly decorated (early Renaissance) marble façade, (this, with details, is given in Gailhabaud, *Monumens*, 4to., Paris, 1850, iv, pl. 4-6), begun 1473 by A. da Fossano (perhaps il Borgognone; Malaspina, *Guida*, 1819, p. 113; 116), to the older church, which comprises chancel, transepts, nave, and ailes, with side chapels, the latter being railed off, but communicating with each other. It is 249 ft. long by 173 ft. wide. The pavements are of coloured marbles, which with the façade, are attributed to P. Pellegrini. The inlayings, in *pietra dura*, of the altars are the work of three generations, the mode of workmanship is exactly like that of the Taje Mahal at Agra (after 1631). The mausoleum of the founder 1490-1562 by Galeazzo Pellegrino, is curiously placed with the feet to the north: the principal portions are by Gian' Cristoforo Romano; some statues by Bernardino da Novi. A fine bronze candelabrum is by Fontana. The curious intarsiatura 1496 upon the slabs of the choir are by Bartolomeo da Pola. The monument to Beatrice d'Este, wife of Ludovico il Moro, died 2 Jan. 1497, cost 50,000 ducats, is supposed to be by Christofano Solari; the cenotaph of Ludovico is by him. The sagrestia nuovi has richly carved presses. The lavatorio de' Monaci is richly decorated Italian, *cir.* 1490; Waring and Macquoid, *Arch. Art*, etc., fol., Lond., 1850, pl. 38. The sagrestia vecchia dates 1478. The cloister of the convent on the south side is stated to be 334 ft. by 412 ft.; its arches are of the finest moulded brick in the cinque-cento style; three sides are occupied by the 23 cells of the monks (each about 20 ft. square), containing two good-sized rooms below, and one above, with a garden behind. The cloister della Fontana has terra-cotta basso-relievos prized by Cicognara for the judgment by which the unknown artist allowed in his proportions for the contraction of the clay in burning. Martino Bassi was consulted upon the works, *cir.* 1580. Millin, *Voyage dans le Milanais*, 8vo., Paris, 1817, p. 5-8, ii, 18, etc. A view engraved by J. Mulder. 6 pl. engraved by permission of the superior of the monastery. The apse, cloisters, spires, chimneys, and clock tower, are given in Gruner, *Terra Cotta Arch.*, fol., Lond., 1865, pl. 29-33.

Pirovaño, *La Chartreuse di P.*, 16mo., Mil., 1823; *Descr. della celebre Cert. di P.*, 12, Milan, 1824. Malaspina, *Descr. della Certosa*, 8vo., Milan, 1818. Durelli, *La Certosa di Pavia*, 63 plates, fol., Milan, 1823-35. *Sammlung von Verzierungen in der Cart. bei P.*, 27 pl., phot., fol., (Milan, 1863). *Una Visita alla Certosa di P.*, 12mo., Milan, 1836; 1865, (Ital., Fr., and Engl.). Street, *Brick, etc., Arch.*, 1855, p. 210-2. Woods, *Letters*, 1828, i, 224.

PAVIA (Juan) de la Jativa, or S. Felipe, with Juan Lloret, 1591, are supposed to have done other works of consideration before being employed as noted s. v. Lloret. 66.

PAVILION (It. *paviglione;* Span. *pavellon;* Fr. *pavillon;* Ger. *zeltdach*). An edifice, as a small house, of a square form, which is isolated, as those at Marly; that of Aurora at Sceaux, near Paris; etc. One 1790 by Besnard, in the parc de Monceau, is given in Normand, *Paris Moderne*, 4to., Paris, 1845, ii, pl. 1-3. The various "pavillons" erected at Paris for the Exposition 1867, are given in Daly, *Revue Générale*, 1867, xxvi. The halls of audience, the pillared halls, and other such apartments in some Eastern palaces, are sometimes described as pavilions. Queen Elizabeth had an "office of the queen's tents and pavilions"; other English monarchs had a like establishment.

A small detached building placed in a park or other large grounds is also so called, to contain a *salon* for refreshments and two *cabinets*, one for the provisions, the other a *garderobe, i.e.*, lavatory, etc.; Blondel, *Cours*, 8vo., Paris, 1773, iv, 183; who refers to that in the kitchen garden at Sceaux. The pavillon des Arquebusiers at Soissons, 1623, is given in Rouyer et Darcel, *L'Art Architectural*, 4to., Paris, 1866, ii, pl. 19-20.

It was in the sense of a small detached house that the term pavilion became attached to the first built residence at Brighton, subsequently enlarged for the prince regent, afterwards king George IV, and thus called "The Pavilion".

The garden pavilion or summer house, in the gardens of Buckingham palace, London, is a small Swiss-looking edifice on the summit of an artificial eminence, overlooking the spacious lawn and piece of water. The interior consists of three rooms and a kitchen; the chief apartment being an octagon of 15 ft. 8 ins. diam. and 15 ft. high from the floor to the centre of the vaulted ceiling. Below the cornice are eight lunettes, which have been filled with frescoes by eight artists. A description from Times *Newspaper*, is reprinted in Civil Engineer, etc., *Journal*, 1845, viii, 261-2; Builder *Journal*, 1845, iii, 349; Gruner, *Decorations, etc.*, 15 col. pl., fol., Lond., 1846.

The pavilion at the Trent Bridge cricket ground, by S. D. Walker, is given in Builder *Journal*, 1872, xxx, 424.

It is also the name for a building which accompanies the different main buildings of a palace, or other edifice, and may be either in the middle of the façade, or at the extremities of it, making a projection, as in the façade of the Louvre, the Tuileries, etc., where also, opposite the pont royal, the building facing two sides of the edifice is called an angle pavilion.

It is also the name given to a large temporary building erected for a public entertainment. *Description of the pavilion erected at Edinburgh*—in honour of Earl Grey, Sept. 1834; by Thos.

Hamilton; 101 ft. square and 12 ft. wider on one side for the ladies' gallery: accommodated 1,570 at dinner; 750 more after dinner, and 330 more in the ladies' and music galleries; ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Transactions*, 4to., Lond., 1836, p. 65-70, with plate. Plan, etc., of the *pavilion erected for the banquet* of the London conservative association, London, 14 June 1837, by H. E. Kendall; a plate, and two drawings in library of Roy. Inst. of Brit. Archts.: and more complete in ALLGEMEINE BAUZEITUNG, 1838, iii, pl. 223. CLELAND, *Description of the banqueting hall*—in honour of Sir R. Peel, at Glasgow, with plans; 8vo., Glasgow, 1837. The *pavilion erected at Liverpool* July 1841 for the dinner of the royal agricultural society of England, designed by J. W. Wild; a polygon of 24 equal sides; diameter between opposite angles 171 ft.; seated 2,850 persons, allowing 1 ft. 8 in. by 3 ft. 9 in. each; to cost £1,115: CIVIL ENGINEER, ETC., *Journal*, 1842, v, 3-4, and cuts. Another plan 113 ft. by 197 ft., with offices attached 14 ft. by 84 ft.; to cost £1,225; accommodation the same; *Idem*. The *pavilion for the meeting* 1843 at Derby to dine 2,200 people, who all faced the speakers, with a gallery for 300 ladies, was 160 ft. by 150 ft.; ILLUSTRATED LONDON NEWS *Journal*, iii, 40-1. The *pavilion for the agricultural society* at Newcastle-on-Tyne in 1846 was 140 ft. by 84 ft., and accommodated 1,500 persons at dinner; BUILDER *Journal*, 1846, iv, 371. The *Congress hall* at Croydon, 1877, by E. Salter, 120 ft. by 96 ft., cost £4,000; BUILDING NEWS *Journal*, 1877, Oct. 12, p. 349.

PAVILION ROOF. A roof which slopes, or is hipped, equally on the four sides.

PAVILION SYSTEM. A system carried out in planning hospitals and similar buildings, as illustrated by the great Lariboisière hospital at Paris, built 1840-1854 by — Gauthier, which is three stories high (BUILDER *Journal*, xvii, 417-24): and by the Herbert general military hospital at Woolwich, by W. Mennie (BUILDING NEWS *Journal*, 1862, ix, 282): and by S. Thomas's hospital in London, designed 1867-71 by H. Currey, (Roy. Inst. of Brit. Archts., *Sessional Papers*, 1870-71). It is in opposition to the "corridor system", as shown in the Royal Victoria or great military hospital at Netley, 1856, by W. Mennie (BUILDER *Journal*, xiv, 457; HUSSON, pl. 12). The pavilion system was recommended as far back as 1788, but has only been acted upon in very recent times. The intention is that each pavilion shall be surrounded on every side with air, except of course at the point where it joins a corridor which connects them all. HOSPITAL.

PAVIMENTUM; see PAVEMENT.

PAVING BRICK; see PAVEMENT; and PAVER.

PAVINGS. The short term used, implying stones for a PAVEMENT.

PAVING SET, for roadway. See GRANITE (p. 76). Mount Sorrel. Welsh granite. PAVEMENT.

PAVING SLAB; see SLAB.

PAVIOUR. A workman who specially lays pavements. A BEETLE, and a RAMMER (Fr. *dame* and *demoiselle*, 5 and 25), are among his utensils. MACERONI, *Hints to Paviours;* etc., 2nd edit., 8vo., Lond., 1833.

PAVONAZZETTO MARBLE. A breccia, having a white ground broken by grey lines; BRECCIA. It is also called marmor Docimenium. STRABO compares it to alabaster, which it not only resembles in the form and character of its veins, but in its diaphonous quality. The blotches are of different shades of purple on a white ground; such are the twelve large columns in the basilica of S. Lorenzo. When the blotches of white and purple are of equal size, it is called pavonezzetto brecciato; such are a pair of columns in the portico of S. Peter's: HEAD, *Rome*, i, 492. CORSI, *Pietre Antiche*, 2nd edit., 8vo., Rome, 1853. A large number of the columns in the old basilica of San Paolo fuori le mure, burnt 16 July 1824; ten fluted columns in the old tribune of Pelagius II, in the basilica of S. Lorenzo, with ten others in the gallery: and two in the nave of S. Agnese fuori le mure; are all stated to be of this marble. 28.

PAVONAZZO MARBLE. A breccia, so-called from the Italian word for violet; it being white with violet spots and veins, and appears to have been but little used by the ancients in their works of art. It is supposed to be the Synnadic marble of the ancients. Columns of it are found in the crypt of Otranto cathedral. The head and leg of a panther, in the British museum, engraved in *Ancient Marbles*, 4to., Lond., 1818, pt. iii, pl. 3, is stated therein to be a variety of the pavonazzo, and as being chiefly of a dingy white, intersected by irregular veins and patches of a dull colour. HEAD, *Rome*, i, 497, describes *bumachella pavonazza* as a shelly substance composed of encrinites, belemites, and star-fish, of a rose colour, sometimes white on a ground of violet colour; it is extremely rare, and only very small fragments have been found. The same author, i, 499, states that of *breccia pavonazza* there are numerous varieties, each distinguished by its purple ground. A rare and beautiful variety is known by its red, white, and very light purple fragments on a ground of still lighter purple.

PAWNE. A term used about 1636 in relation to the Royal Exchange in London, as "certaine feather makers and others that keepe shopp in the upper pawne—do use and keepe pannes of fyre—upon pretence of use thereof for their trades": BUILDER *Journal*, 1846, iv, 2.

PAX JULIA or PAX AUGUSTA. The Roman name for BEJA, in Portugal.

PAX AUGUSTA. The Roman name for BADAJOZ, in Spain

PAXTON (SIR JOSEPH, and M.P.), born 3 Aug. 1803 at Milton Bryan, Bedfordshire, was educated for a gardener, and employed at Chiswick. By the duke of Devonshire he was invited about 1827 to Chatsworth, and 1840 became house steward. He formed several hot-houses and 1850 the Victoria regia house (SOCIETY OF ARTS *Journal*, 13 Nov. 1850; GARDENER'S CHRONICLE; CIVIL ENGINEER, ETC., *Journal*, 1850, xiii, 324-5): this structure was the type of his suggestion for the building for the Great Exhibition of the Industry of All Nations 1851 in London; the semicircular roof, the chief feature of the building, was, however, suggested by Sir C. Barry. The design was adopted at the last moment, after a competition when 245 designs were submitted, and after a composite design had been made by Sir W. Cubitt. It was subsequently removed 1852-54 to Sydenham, and is known as the Crystal palace. About this latter period he designed a glass-roofed London thoroughfare, as illustrated in a parliamentary paper on Metropolitan Communications; and a permanent exhibition building for the environs of Paris.

The village of Edensor, near Chatsworth, was rebuilt from Paxton's designs; also the farm buildings at Chatsworth; and 1840 a conservatory at Darley Dale. With his son-in-law and partner, G. H. Stokes, he designed 185 -57 Mentmore, Buckinghamshire, for baron Mayer A. de Rothschild (plan and view in BUILDER *Journal*, 1857, xv, 738-41), as well as the dairy and cottage, and the labourers' cottages: the mansion at Ferrières, near Paris, for baron James de Rothschild, with the lodge and entrance: extensive alterations and additions since 1853 to Lismore castle, co. Waterford, Ireland, for the duke of Devonshire (BUILDER *Journal*, xiii, 492; BUILDING NEWS *Journal* 1858, iv, 38): laid out the grounds of Burton Closes, near Bakewell, for John Allcard, esq., the house having been partly designed by him: laid out about 1845 a park at Liverpool; about 1851 that at Birkenhead; those at Hull, Glasgow, and Dundee (a pavilion at the latter place being designed by Mr. Stokes); and the Coventry cemetery (the chapels and lodges by Mr. Stokes; laid out the park at Dunfermline in Scotland; and erected the first portion of the mansion at Battlesden park, near Dunstable, for sir Ed. Page Turner, bart., at a cost of £12,000. He died 8 June 1865, aged 61, at Sydenham, and was buried at Edensor. Memoir in BUILDER *Journal*, 1865, xxiii, 421-2; 442-3, where further details of his career are given. The ridge and furrow roof was first employed by him 1833 in the pine house at Chatsworth, and the "Paxton gutter"

and the "Paxton roof", with other details and illustrations of the Great Exhibition building, are given in INSTITUTION OF CIVIL ENGINEERS, *Transactions*, 8vo., Lond., 1851, x, 127-191, by M. D. Wyatt; and in the works of BERLYN and FOWLER; DOWNES and COOPER; ROB. ELLIS; ALLG. BAUZEITUNG, 1852, pl. 363, etc., 2nd ser.; PENNY CYCLOPÆDIA, 2nd Suppl.; CIVIL ENGINEER, ETC., *Journal*, 1850, xiii: 1852, xv, 57-65. OFFICIAL ILLUSTRATED CATALOGUE, 8vo., Lond., 1851, i, p. 49.

PAYEN (ANTOINE MARIE JOSEPH), born 5 May 1749, at Tournay, designed the chapitre des dames Chanoinesses at Namur; the châteaux de Froïenne, de la Bellière, and à Barsche; the maison, marché au Bois; 17...-85 the plan and interior decoration of the church (begun by — Guimard) of S. Jacques, at Bruxelles; 1788 a house near Laeken for Edward Walckiers; the decorations 1782 of the palais royal at Laeken, designed by — Montoyer; and the completion (begun 1790 by — de Wailly) of the pavillon d'Hingene, near Antwerp, completed 1794. The infirmaries 1780 of the Salpétrière at Paris are attributed to him by HUSSON, *Etudes sur les hôpitaux*, 4to., Paris, 1862. He died 29th June 1798 at Bruxelles. GOETGHEBUER, *Choix des Mons.*, fol., Ghent, 1827, p. 1, 6, 9, 24; and pl. 1, 9, 14, 36-7.

PAYEN (AUGUSTE), born 17 October 1759 at Tournay, son of the above, designed 1803 the château de marché les Dames, near Namur; and the porte de Ninove at Bruxelles. He died 16 September 1812; GOETGHEBUER, *Choix de Mons.*, p. 53, pl. 78.

PAY-LEOU; now written PAILOO and Pailow.

PAYMASTER. The official deputed to pay wages, etc., or master tradesman, when the work is extensive and done by day work, or by the piece, without the intervention of a contractor. But at the erection of S. Paul's cathedral under Sir C. Wren, where master tradesmen were employed, as mason, carpenter, etc., and the men were not paid direct, as the following would imply, the "clerk of the works and paymaster", had "constantly to attend the service of the work to take care that carpenters, labourers, etc., who work by the day be employed in such business as the surveyor hath directed to be done; takes an account together with the assistant-surveyor what stones are brought into the work; he receives and pays all the money for workmanship and materials according to a list of debts directed by Mr. Surveyor; he keeps and makes up all accounts; is chargeable with all the stores and inspects the delivery thereof to the workmen; he is also clerk to the commissioners, and enters all orders and contracts; etc. His salary is £100 per ann." British Museum; *Harl. MS.*, No. 4941.

The II KINGS, xxii, 3-7, shows the confidence placed in the integrity of those engaged in the works of repairing the Temple.

1371 the wages were paid to the workmen once a fortnight at York cathedral; SURTEES SOCIETY, *York Fabrick Rolls*, 8vo., 1859, p. 5.

1560 petition of Fulk Onslowe to the queen for the offices of paymaster and clerk of the works; ROLLS RECORDS, Domestic Series, p. 165.

PAYNE'S GREY; see GREY.

PAYNE'S PROCESS FOR PRESERVING TIMBER from the ravages of the DRY ROT; commonly called PAYNIZING, patented 1841. The process consists in impregnating timber with a solution of the sulphate of iron, and afterwards with the muriate of lime, which combines with the iron, and forms an insoluble chemical preservative, impregnating the timber to the very centre. This is effected by placing it in large iron tanks with the solutions, exhausting the air and afterwards readmitting it; and then using a force pump with a pressure of 200 lbs. on the square inch, to force the solution into the heart of the timber, which it does very effectively when due care is taken. The process, now perhaps disused, is described further in BUILDER *Journal*, July, 1843, i, 268; and CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 217, 314. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 8vo., Lond., 1853, xii, 216-43, also reprinted in same *Journal*, xvi, 75, in which it is stated that "this process has been largely introduced in this country with various results. Some cases are known where timber, prepared many years ago, is still in a good state of preservation; in others, where the operations were not well performed, the results have not been satisfactory. In France, this process having been more carefully applied, has succeeded much better, and it is used, at the present day, to some extent. Sufficient time has not yet elapsed to demonstrate its uniform efficacy, or to render it popular, as a preservative against the diseases, or decay of timber." Cases were cited

This system was also thought to render timber uninflammable. Experiments 2nd Aug. 1848 with a liquid made of sulphuret of barium or calcium (by preference) on two cottages, are recorded in CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 287.

PÉ, PEDE, PEEDE, and PREEDE (HENRI VAN), "architecte-constructeur" in 1515 to the city of Bruxelles. Having been invited to Oudenaarden, he designed 1525-30 (or 1527-30 by others) with W. de Ronde, the small hôtel de ville (Flamboyant) in that city; 1514-23-31, completed the maison au pain (*broodhuis*) or maison du roi, at Bruxelles, designed and begun by A. Keldermans and others, (restored 1841, and now the cercle artistique et littéraire); he also worked at the chapel of the S. Sacrement in the church of S. Gudule. Besides the references s. v. Oudenaarden to the MESSAGER, etc.; REVUE DE BRUXELLES, 8vo., Brux., 1837, iv, 8; COMITÉ ROYAL D'HIST. DE BRUX., *Bulletins*, 1838, xiv, 588; 590-1; STAPPAERTS, *La Belgique Mont.*, 8vo., Brux., 1844, i, 111, gives a view; also MOYEN AGE MONT., pl. 45; and GOETGHEBUER, *Mons. des Pays Bas*, fol., Brux., 1827, p. 69. MESSAGER DES SCIENCES, 8vo., Ghent, 1842, p. 9-10, describes the maison au pain, with a view.

PEABODY DWELLINGS for the poorer classes; see LODGING HOUSE (MODEL).

1869, Homes for the Working Classes. BUILDER *Journal*, xvi, 258.

—— Dwellings for the Industrial Classes, by T. Chatfeild Clarke, *idem*, p. 311.

DARBISHIRE, *Dwellings for the Poor*, read at Roy. Inst. of Brit. Archts., 13 Dec., Session 1875-76. Octavia HILL, *Homes for the London Poor*, 8vo., Lond., 1875. GILBERT, *Philanthropy and Common Sense*, in GOOD WORDS *Journal*, August 1875, p. 528.

PEACE; TEMPLE OF. A temple of Peace at Rome was founded by the emperor Claudius (41-54) and finished by Vespasian (69-79) after the conquest of Judæa, to contain the spoils: it is mentioned by JOSEPHUS as a most sumptuous building. The atrium around it has been called the forum Vespanianum. It had a fine library. It was burnt in the reign of Commodus (180-193); the site is probably near the basilica of Constantine and behind the church of SS. Cosmo and Damiano.

The magnificent ruin situated on the north-east side of the Campo Vaccino, at Rome, formerly called the Temple of Peace, was first suggested by NIBBY to be the basilica begun by Maxentius, 312, and completed by his successor (306-337), whence it is now called the basilica of Constantine. The remains (as given in GWILT) are 294 ft. long outside, with a vaulted porch 30 ft. wide and 35 ft. high, extending along the whole end (which is 235 ft. wide outside, or) 197 ft. inside, and is supposed to have been the entrance. The centre or nave (about 82 ft. 6 ins. wide) is divided from ailes (about 51 ft. wide and 80 ft. high) by three large arches 80 ft. (or 76 ft.) span, and was covered by three coffered groined vaults, now fallen in, 116 ft. (or 120 ft.) high from the pavement, which is of cippolino, giallo-antico, and other coloured marbles. The vault sprang from 8 monolith Greek white marble fluted columns of the Corinthian order, now gone, each 62·337 ft. high (the shaft 52·4 ft. high in GWILT), and 6·041 ft. diam. (also stated as the shaft 46 ft. 8 ins. high and 17 ft. 6 ins. circumference); the last column was removed 1614-9 by order of pope Paul V, by C. Maderno, to the piazza Sta. Maria Maggiore, and raised on a lofty pedestal, and on it a bronze statue of the Virgin by Guil. Bertolet was placed. Excavations were made 1870, and the pavement laid open by PARKER; it is shown in his *Forum Romanum*, 8vo.,

Oxford, 1876, pl. 33-6. Palladio, *Architettura*, fol., Venice, 1570, chap. vi; and edit. by Leoni, fol., 1740, pl. 2-4. Serlio, *Architettura*, fol., Venice, 1663, p. 103-4 (plan and section). Desgodetz, *Rome*, fol, Lond., 1771, i, 53, and two plates, and the column, with dimensions in French feet which is apparently the only source for them; and used in Gwilt, *Encyc.*, 1876, and earlier editions. Burn, *Rome*, 4to., Camb., 1871, states that the arches are 68 ft. wide and 80 ft. high; the nave 80 ft. wide and 115 ft. high. Burgess, *Topography*, 8vo., Lond., 1831 (plan), i, 288-94. Letarouilly, *Rome Moderne*, text 4to., Paris, 1840, p. 621, with a cut from an old view, showing the vaulting of the recesses and a second remaining column, which is also shown in the view given in Gamucci, *Dell' Antichita*, 4to., Rome, 1565. Braun, *Ruins, etc., of Rome*, 12mo., Bruns., 1854. p. 8; and 18. Fergusson, *Illust. Handbook*, 1855, i, 320; and *History*, 1865, i, 295. Taylor and Cresy, *Antiq. of Rome*, fol., 1874, pl. 130, gives a plan. Canina, *Architettura Romana*, fol., Rome, 1834, devotes iii, pl. 96 and 97, to a plan and restorations; and text, ix, 283-7. A restoration of the elevation is given by Ashpitel in his view of "Rome as it was", 1866, chiefly from a plan in the royal library at Windsor, which purports to have been made for cardinal Albani at the time of the dismantlement of the building. 1. 28.

PEACH BLACK. A black being a carbon made from peach kernels. It is similar to Frankfort black, one of the best black pigments known. 9.

PEACH BLOSSOM RED. This is formed of red with white and some grey. It is represented by Lepidolite; cobalt bloom. Ansted, *Elementary Course, etc.*, 8vo., Lond., 1850.

PEACH HOUSE. A structure for the culture of peaches: a house where grapes are similarly grown is thence termed a vinery. A moderate and useful sized house would be 32 ft. long internally, 12 ft. wide, 13 ft. high at the back, and 18 ins. high in front, thus making the lights of a steeper pitch than required for a greenhouse, etc. The back wall would be about 2 ft. thick, the front and end 14 ins., or a total outside width of 15 ft. 2 ins. A low 4½-in. wall is built along the house at the distance of 12 ins. from the back wall, and 3 ft. 3 ins. high above the footing courses, enclosing a bed 12 ins. wide for creepers to be trained upon a trellis fixed to the back wall, and also as a support for the flagging of a walk 3 ft. wide, which in this sort of house is the only one, the space in front being occupied by a bed of mould 4 ft. 7½ ins. wide. Between the walk and this front bed is to be a brick wall 3 ft. thick and 2 ft. high above the footings. A 4½-in. wall is built along the top of this on the side nearest the walk, of 5 courses or 15 ins. high. A similar wall, but 9 ins. thick, is formed along the front side, and 9 courses or 27 ins. high. Large fire tiles 2 ft. wide by 4 ins. thick are laid on the first-named of these two walls, their front corners being supported on brick piers, at intervals of 9 ins., each pier being 9 ins. long, 4½ ins. wide, and 15 ins. high. The tiles must be set close, and the joints secured with fireclay. The piers must be bonded to the 9-in. front wall by headers at every 9 ins., according to the usual manner of constructing a hollow wall. On the front and back edges of the fire tiles are to be built 4½-in. walls three courses high, of firebrick set in cement, which will form a gutter 15 ins. wide by 9 ins. deep, to be cemented in a watertight manner at the sides and bottom. The space under the fire tiles being well pargetted, will constitute a longitudinal air-flue about 18 ins. by 15 ins. high, discharging warmed air throughout its entire length, through the spaces between the before-mentioned piers into the hollow wall, and thence into the house. The warmed air will be supplied to this chamber or flue at the end near the boiler, from a space surrounding the boiler flue. The lower pipe of the hot water heating apparatus is set at such a level as to be half immersed in the water contained in the gutter, by which means the latter will be rapidly evaporated, and a very moist atmosphere easily obtained. A water cistern of cast iron about 2 ft. square and 30 ins. deep, should be fixed outside the back wall of the house, over the boiler. A ¾-in. lead pipe may be led from this cistern to the end of the gutter with a draw-off cock for regulating the supply of water.

The peach houses at Worsley Hall, Lancashire, are 39 ft. long and 14 ft. wide, their front and back walls, the rafters, sashes, and bars, are precisely the same as those for the vinery, but have the floor perfectly flat, and formed of loose earth, with the exception of a walk at the back 3 ft. wide, which is flagged and bedded level with the surface of the earth. The trees are trained on iron frames made to form a trellis, about 18 ins. from the glass, screwed to the underside of the rafters. At the back, 2½ ft. below the glass, is an inch shelf 18 ins. wide, formed of 2-in. slips of wood 2 ins. apart, for small plants in pots. These houses have no upright front lights, but a brick wall 2 ft. high. They are glazed with patent polished sheet-glass 21 oz. to the square foot, in lengths of 3 ft., by 7 or 8 ins. wide. A gutter of brick lined with cement, in which are two rows of 4-in. hot-water pipes, runs along the front wall, and along the middle of the earthen bed are two rows of 6-in. hot-water pipes: R. S. Burn, *Conservatories, etc.*, 4to., Lond., 1852-3.

PEACOCK. This bird was an attribute of the goddess Juno. On Roman imperial coins it bears the empresses up to heaven. The flesh of this bird was supposed to be incorruptible (S. Augustin; Comarmond, in *Ill. Cat.* of the Lyons museum), hence the peacock is said to have been adopted by the Gentiles to represent the immortal soul, and was subsequently introduced by the primitive Christians; Cyprien Robert, *Cours d'hiéroglyphique Chrétienne*, in *Université Catholique*, vii, 35; Molanus, *Hist. Imag. Sacrarum*, 4to., p. 184; Munter, *Symbola Veteris Ecclesiæ*, 4to., p. 30. Representations occur in the paintings in the catacombs of Rome; Bosio, *Roma Sott.*, pl. to p. 642: D'Agincourt (Painting), pl. xii, No. 14; Aringhi, *Roma Sott.*, ii, pl. 326. Bottari, *Sculture, etc., dei cimiterii di Roma*, fol., Rome, 1737-54, ii, pl. xcvii; and iii, pl. clxxxiv, gives a peacock with outspread tail from the catacombs of SS. Marcellinus and Peter, and of S. Agnes. The rainbow formed by the tail of a peacock has been also considered an emblem of Christian immortality. Representations of the peacock and the phœnix, which symbolised the Resurrection, have been occasionally confounded by some writers. Mamachi, *Antiq. Christ.*, iii, p. 92. Cahier et Martin, *Mélanges d'Arch.*, ii, 259. De Caumont, *Bull. Mont.*, xi, 218. Builder *Journal*, 1858, xvi, 604; 631; 646; 721. "On the ivory tabernacle in the sacristy of the cathedral at Sens, a pine cone, corresponding to the cross and the Tree of Life of the Assyrians, is placed between two faithful Christian souls, figured as peacocks, and by the palm branches attached to their necks they are shown to have been martyrs also. Christian souls are less frequently figured as peacocks than as doves. In the cathedral of Vienne at Dauphiné, is a sarcophagus containing the remains of an ecclesiastic of rank; two peacocks are represented feeding on the grapes of a vine growing out of a vase or sacramental cup." In the "paradise of Osiris" depicted on a wall at Pompeii, the peacock occurs along with the dove and the heron, among the sacred trees, the palm tree and the perséa; Barlow, *Symbolism*, at Royal Inst. of Brit. Archts., 1859-60, p. 160. "But soon the lions, the peacocks, the Greek statues of the Dromos, etc., appeared: thus was the Serapeum discovered —the upper half of a boy riding on a peacock, apparently of rude execution, is also visible; the rest is already as completely overwhelmed as if it had never been uncovered—twenty years ago (1857); Edwards, *Up the Nile*, 8vo., 1877, i, 80. The palm tree with a peacock (?) on each side occurs in the mosaics at the castello di Ziza, near Palermo; *Illustrations*, s. v. Corbel, 1851, iii, pt. 1, pl. 53. Auber, *Hist. et Theo. du Symbolisme Religieux*, 8vo., Paris, 1870. At S. Prassede, at Rome, a peacock with a nimbus is represented in the grand mosaic of pope (817-24) Pascal I. Barlow, *Symbolism*, 8vo., Lond., 1866, p. 74, whose original illustrations to it are now in the library of the Royal Institute of British Architects.

In later ages, the peacock is found represented carried at ban-

quets upon a dish, decorated with all its feathers; MARCHANGY, *La France au XIV siècle*, iv, 158; 353. In decoration the peacock has been used in the corners of a ceiling; CIAMPINI, *Vit. Mont.*, i, pl. 75. SMITH, *Dict. of Antiq.*, s. v. Pea fowl house, p. 67, describes how they were reared by the ancients.

"The peacock was a favourite armorial emblem of the Rajpoot warrior; it is the bird sacred to their Mars (Kumara). The feather of the peacock decorates the turban of the Rajpoot, and the warrior of the Crusade, adopted from the Hindu through the Saracen;" TOD, *Rajasthan*, 4to., Lond., 1829.

PEACOCK (JAMES), was born about 1735 or 1738. Very little is known of this architect, who was for nearly 45 years in the office of works at Guildhall, London, probably not officially connected, but as assistant to G. Dance, jun, architect to the corporation, chiefly in his private practice; and with whom he formed Finsbury Square, 1777-91, residing at No. 17, which apparently he built for himself. Only the following works have been found attributed to him: a drawing of the elevation of the Mines Royal, Dowgate Hill, in the King's collect., Brit. Mus.: he designed 1801-2 the first Stock exchange in Capel court, London; rebuilt 1853-4; and "restored and preserved" the church of S. Stephen's, Walbrook.

His description of *Three simple Instruments for drawing architecture and machinery in Perspective*, was printed in the PHILOSOPHICAL TRANSACTIONS, 1785, p. 366; he published *A new method of Filtration by Ascent*, 4to., Lond., 1793; OIKIDIA *or Nutshells by Jose Mac Packe, bricklayer's labourer*, 8vo., Lond., 1785; 1786 (eulogised in GWILT, CHAMBERS, *Decorative Part*, etc., 4to., Lond., 1824, p. 99); and *Subordinates in Architecture*, 4to., Lond., 1814. A MS. folio volume compiled by him, being "Terms of Contracts for Bricklayers', Slaters', and Joiners' Works, on the Peace Establishment, for the Service of the Board of Ordnance", is in Sir John Soane's Museum. He died 22 Feb. 1814, "in the 76th year of his age", according to the headstone in the back cemetery of S. Luke's church, Old Street; but 79th as stated in GENTLEMAN'S MAGAZINE.

PEACOCK'S EYE BRECCIA; see BRECCIA.

PEAK SAUL OR SALVO; see PTEROCARPUS.

PEARC, PEARCH OR PERCH. A small projecting beam. It is also a small corbel or bracket, such as were placed near the altar in a church, and decorated on festivals with a statue, reliquary, etc. A tabernacle with perches is mentioned. "Pearcher" was an old term for a large wax candle formerly used in a church. 19. 22.

Boards are placed in a pearc, perch, or steer, to season, a term used at Manchester and in Yorkshire; probably from the small projecting arm or fillet or stick, at the top of the frame separating the boards to allow of air passing between them. The whole frame is called a "rack" in London.

PEARCE (EDWARD), published *Friezes*, 12 pl., fol., (1680?). REDGRAVE, *Dict.*, 1874, writes it Peacke.

PEARCE (Sir EDWARD LOVET), captain, appears to have made the designs for the parliament houses in Dublin, begun 3 Feb. 1728-9, for Thomas Burgh, esq., of the office of director-general and overseer of fortifications and buildings in Ireland, 1700-30; and then Pearce as "engineer and surveyor-general of H.M. works in Ireland", carried them out, receiving £2,000 for his care, until his death, when he was succeeded by Arthur Dobbs, esq., to whom was voted £250, and the works completed about 1739, the expense amounting to £40,000. In the *Constitutions of The Free Masons*, 8vo., Dubl., 1730, p. 37, Pearce is called "the contriver and projector", and "the architect" of this work. Pearce died at his country house in Stillorgan, co. Dublin, and was buried at Donnybrook, but a search there has not found any tomb; the register gives the entry "Buried Sir Edward Pierce, December 10th, 1733." BUILDER *Journal*, 1872, xxx, 410; 451; 511; xxxi, 164-5. HARRIS, *Hist.*, 8vo., Dubl., 1766, p. 410. MALTON, *Dublin*, obl. fol., Lond., 1792-9. WHITELAW and WALSH, *Dublin*, 4to., Dubl., 1818, i, 529. MULVANY, *Life of Gandon*, 8vo., Dublin, 1846, p. 117. GILBERT, *Hist. of Dublin*, 8vo., Dubl., 1854-59. This work has also been attributed to — PENROSE; and to R. CASSELLS or Castell, who it has been stated did not arrive in Ireland until 1737. In the "King's collection" at the British Museum, are five large folio plates, consisting of plan, elevation, view, and two sections of this building, published 1767, by Bernard Scalé, land surveyor, etc., Dublin. They are very carefully engraved, and have the name of Rowland Omer, delt., without that of the designer or architect.

PEARCE or PIERCE (WILLIAM), is generally stated to have carried out 1680-82 the church of S. Clement Danes, in the Strand; but "Edward Pearse with John Shorthose", were the masons who rebuilt the church and chancel of S. Clement Danes, in the Strand, from the designs of Sir C. Wren. The agreement, dated 13 May 1680, is in the British Museum, *Add. Charters*, 1605. The works cost £8,786 17s. The tower is by J. Gibbs, 1719.

PEARL ASH; see POTASH, or potassium.

PEARL GREY; its equivalent is stated s. v. GREY.

PEARL WHITE. A pigment also called Spanish white: see BISMUTH, which turns black. Another pearl white, and more properly so called, is prepared from the waste of pearls and mother of pearl, which is very white, of good body in water, but of little force in oil or varnish. It combines with all other colours, without injuring the most delicate, and is itself perfectly permanent and innoxious. 9. 23.

PEAR-SHAPED DOME. One of the common forms of termination to belfries at Moscow and elsewhere, which was apparently obtained from Jerusalem, Damascus; at Orfah in Mesopotamia, Shiraz and Ispahan in Persia, Egypt, Barbary, and Abyssinia, Bagdad, in the dominions of the great Moghul, at Delhi, Agra, Meerut, Elichpore, the Deccan, etc., the domes are principally bulbous shaped; it may be traced in the Burmese pagoda, and a compound of it also in Nepaul; A. W. BROWN, *History of Bells, and their connection with Mythology, etc.*, in UNITED SOCIETIES, *Reports and Papers*, 8vo., Lincoln, 1858, p. 298-9. But PRISSE D'AVENNES, *Arch. Arabe*, i, gives pear-shaped domes which are not bulbous-shaped domes.

PEAR TREE; see PYRUS: and FRUIT.

PEAT. A substance consisting of the twigs, leaves, and roots of trees, mixed with grass, straw, plants, and weeds, especially *sphagnum*, that have laid long in water, and become converted into a blackish brown mass that may be cut with a spade, and dried for fuel. The peat or turf bogs, some 40 ft. deep, of Ireland extend over 2,830,000 acres. It is known as *tourbe* in France, where it prevails to a great extent in the neighbourhood of Amiens. Peat is often used for calcining limestones and burning bricks in localities where wood and coal cannot be procured easily.

ANDERSON, *Practical Treatise on Peat Moss,—for affording fuel*, 8vo., Edinb., 1794. *Use of Peat in the Manufacture of Iron*, INST. OF CIVIL ENGINEERS, *Proceedings*, 8vo., Lond., 1839, p. 29; 37; 68. *Sea Defences Constructed with Peat Moss*, idem, 1841, p. 140; vi, 483. KANE, *On the Industrial Resources of Ireland*, 8vo., Dublin, 1845, 2nd edit., p. 35-43, referring to AHER, *Bog Reports*; PORTLOCK, *Memoir* of the Ordnance Survey of Londonderry; and NIMMO and GRIFFITHS, *Bog Reports*. It was stated that peat bogs were susceptible of being worked with results of high value, but denied; ILLUSTRATED LONDON NEWS *Journal*, 1849, xv, 94. The model station of the Irish Amelioration Society, erected at Derrymullen on the bog of Allen, for converting peat into charcoal, is described, etc., in ILLUSTRATED LONDON NEWS *Journal*, 1850, xv, 263-4. BUILDING NEWS *Journal*, 1865, xv, 504; 568. 14.

A cubic yard of good turf, *i.e.*, peat cut and dried, packed close in sods, weighs about 900 lbs. The densest turf well packed will go so far as 1100 lbs. per cubic yard; but the light turf of which so much is burned, may not weigh more than 500 lbs. The density of the turf affects many of its technical uses. Coal is about twice as dense as average turf.

PEBBLE PAVEMENT. A pavement formed of round stones collected from the sea beach, mostly obtained from Guernsey or Jersey; or from gravel pits. It is very durable, but requires to be well laid. The stones vary in size, but those from 6 to 9 ins. deep are the best; those of 3 ins. in depth are called *boulders* or *bowlers;* and are used for paving courtyards and those places wherever heavy weights do not pass. "Round shingle and footway pebble" are occasionally used at sea-side places, where the material is readily obtained. A ton of pebble paving will cover from 4 to 4½ yards; and of ragstone from 5 to 5½ yards.

A bed of large pebbles on which an effigy is laid, is seen in the tomb of Sir Thomas de Burgh, at Burgh Green church, Cambridgeshire, about 1345, and is a late example; the figure has the left leg crossed over the right. There appear to be only two other examples of this bed in England; one at Ingham, Norfolk, of Oliver lord Ingham 1344; and the other, Sir Roger Kirdeston, 1337, at Reepham. The bed is intended to represent "being a great traveller he resteth on a rock"; or "lying on a rock as if shipwrecked".

PECHMANN'S BRIDGES. These are formed of timber, chiefly on the bow and string principle. Examples are given in ALLGEMEINE BAUZEITUNG, 1840, pl. 341-7; as at Passau, of 7 spans, 78 ft. each; Wasserburg, 6 spans, 64 ft.; Augsburg (5), 62 ft.; Gunzburg (4), 62 ft.; Ottershausen (3), 66 ft.; Vielshofen (3), 62 ft.; Augsburg (3), 45 ft.; Kuffstein (3), 100 ft.; Neuhaus (1), 156 ft.; two others of 120, two of 108, and one of 78, all Vienna feet.

PECK. A measure of two gallons, or a fourth part of a BUSHEL; it is used as a measure of dry goods only.

PECK (FREDERICK), A.I.C.E., born about 1828, was a native of Cambridge, and early established at Maidstone, where he, with his partner — Stephens, designed several buildings, as 1860 the baptist chapel, King street (BUILDER *Journal*, xviii, 384); and St. Paul's church: 1859 the royal Albert benevolent society asylum, Cambridge, cost £1675. 1860 the assembly room of the Guildhall at Cambridge, cost £6,200; in the competition for the enlargement of which they gained the first premium; views in BUILDER *Journal*, xvii, and xviii, 24-5; 119; 616; 677: BUILDING NEWS *Journal*, v, 1145. 1861-2 the Agricultural hall Islington, at a total cost of about £32,000, a remarkable work, and covering nearly 3 acres: BUILDER *Journal*, xix, 572, 640, 771; xx, 395, 868: the Albert Middle Class colleges at Framlingham; Bedford; and 1866 Trent, the last at a cost of about £20,000; 1861 Faversham lecture hall; Workhouses at, 1859 Chatham, East Grinstead, Hertford, Whittlesea, and Maldon; Lincoln county prison; Suffolk county college; the Works Hall, Leiston; Beddington female orphanage; several churches and schools; 1869 Messrs. Elkington's premises, Regent street, corner of Jermyn street; and some portion of house, Crown Point, Norwich, for Sir Robert Harvey. He was ill for about three years, during the latter part of which time his partner, H. E. Coe, assisted him in his works. He died 22 March 1875, aged 47, at Yoxford, Suffolk. BUILDER *Journal*, 1875, xxxiii, 295; BUILDING NEWS *Journal*, xxviii, 372.

PECKY. An American term for timber in which the first symptoms of decay appear. 1.

PECTINATUM TECTUM. A kind of roof among the Romans, which was shaped like a comb and threw off the water in two ways. SALMASIUS, in SPARTIAN, *Hist. Aug.*, 8vo., Lug. Bat., 1671, p. 675. AQUINUS, *Vocab.*, 4to, Rome, 1734, p. 158, defines those words as, "Quod est in duas partes divisum, ut testudinatum in quatuor; FESTUS."

PEDESTAL (perhaps from Gr. *πους* a foot, and *στυλος* a column; also *stylobata; stereobata;* Ital. *piedestallo;* Sp. *pedestal;* Fr. *pied d'estail, piédestal;* Ger. *piedestal; säulenstuhl*). A pedestal consists of three principal parts; base, DADO or die, and cornice. The proportion of a pedestal varies with each order. VITRUVIUS, in the Tuscan, Doric, and Corinthian orders, does not mention the pedestal, and in the Ionic order he seems to consider a pedestal rather as a part in the construction of a temple, than as belonging to the order itself. CHAMBERS, *Decorative part of Civil Arch.*, fol., Lond., 1759, notices that "some authors are very averse to pedestals, and compare a column raised on one to a man mounted on stilts", etc., a chapter to which the reader is referred for the remarks on the non-use of detached pedestals; and the cautions against the employment of triangular, circular, and polygonal, pedestals, and such as are swelled and have their die in the form of a baluster, or surrounded by cinctures; "extravagancies which were rife in the age of Louis XV", as stated by GWILT, *Encyc.*, edit. 1876, p. 835-6, who gives a table showing the height of pedestals in ancient Roman works, and the modern ones of Palladio and Scamozzi; amongst the former are the temple of Fortuna Virilis, the Colosseum, and the arches of Constantine, Titus, of the Goldsmiths, and of Septimius Severus. Other examples are at the temple of Jupiter at Spalato; two temples at Palmyra (WOOD, *Palmyra*, pl. 32), and at Baalbec. PODIUM is at times a sort of continuous pedestal; and a plain PLINTH often does duty as a pedestal.

"In the Incantada at Salonica (STUART, *Antiq. of Athens*, 1827, iii, chap. xi, pl. 46-8), the pedestals are of the same character as those in the Poikile (now known as the Pantheon of Hadrian), and in an example at Teos (SOCIETY OF DILETTANTI, *Ionian Antiquities*, 1821, chap. i, pl. 5). As no instance of a pedestal is seen—(perhaps) in any Roman work, this may be regarded as an original practice of the Greeks, and thence it may be concluded that no building wherein this kind of pedestal is seen, can be of so late a date as the reign of Hadrian, but of a much earlier age.—Regarding the pedestals on which the plinths of the columns over them *project beyond the die* of the pedestal, examples have been also discovered at the ruins of a portico or agora at Samos, probably of a Doric column of the Roman period (*Ionian Antiquities*, 1821, chap. v, pl. 7). At Ephesus and Laodicea such bases are also seen; and in the British Museum are two pedestals of a similar class, brought from the Troad. This practice seems to have been adopted by the Greeks and Asiatics after the age of the Cæsars. No such examples are seen at Rome in their original situation. PIRANESI, *Magnificenza de' Romani*, fol., Rome, 1761, tav. x, gives a very highly decorated detached base and pedestal from the church of the Virgin S. Prassede. At the theatre at Catania, is a marble base and pedestal, also wrought in one block, highly enriched with Corinthian ornament, apparently of the same age; it belonged to the proscenium, the plinth is somewhat within the die of the pedestal; ITTAR, *Ant. Edif. di Catania*, fol., Cat., 1812, pl. 5-6." STUART and REVETT, *Antiq. of Athens*, fol., Lond., 1827, iii, p. 9, which volume, p. 126, pl. 54, gives "cornices and mouldings of pedestals" at Delos, but their position is undefined.

At the temple of Minerva (Sta. Maria della Minerva), near Assisi, the Corinthian columns of the portico stand on low pedestals each having a cornice and plinth, the underside of the former is level with the platform; between them are four steps up to it, with three or more steps along the façade. The representation in PALLADIO, *Architettura*, fol. edit. by LEONI, Lond., 1742, b. 4, chap. xxvi, pl. 80-2, is not correct; it is shown in ANTOLINI, *Il Tempio di M.*, fol., Milan, 1803; and in a photograph of about 1865. There is also such an example in Greek work at the temple at Segeste, where the breaking of the upper step or plinth on which the columns stood, forms, under each column, a cubical block of masonry; SMIRKE, *Lecture* on "Basements", BUILDER *Journal*, 1858, xvi, 101. Taking STUART, *Athens*, for pedestals only (except the wall under the caryatid figures of the Pandroseium, and the monument of Thrasyllus), the chief information is in the tail-piece to vol. i, cap. 1; the pedestal of the statue of Agrippa at the steps of the Propylæa, ii; and the monument of Philopappus, iii.

Illustrations, Pedestal, ii, 1849-50, pl. 48, fig. 1, gives a sumptuous method of overcoming the difficulties of a ramp in stone or marble: fig. 2, ornamented by a *mazzoccho* or emblematical lion of Florence, from the palazzo del podestà now del bargello: fig. 3, from the gardens of the Borghese palace, and forms a

pleasing termination to the protection (PODIUM) of a terrace walk: and *Illustrations*, Baluster, i, 1854-55, pl. 104, fig. 5, from the Via delle Tre Pile at Rome. NICHOLSON, *Dict.*, 1835.

Pedestals were used during the several periods of the Mediæval style, at first as little more than a plinth; during which time BACE appears to have been the name given to the pedestal of a statue in a niche. The pillars on the north side of the early Decorated nave of All Saints church, Naseby, have a pedestal to each; *Churches of the Archdeaconry of Northamptonshire*, 8vo., Oxford, 1846, p. 239.

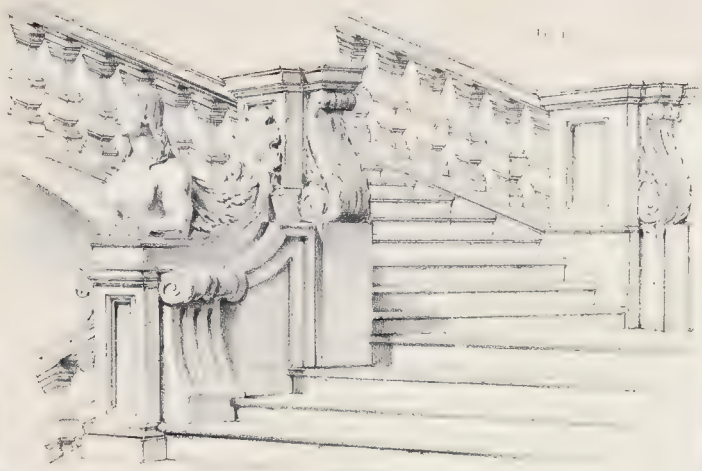
PEDESTAL FOR STATUES. Whatever may have been the Latin term, and PLINY perhaps supplies it, *Nat. Hist.*, xxxiv, where he says, "Et Atti Navi statua fuit ante Curiam cujus basis conflagravit Curia incensa", *το σφέλας* appears to have been a Greek name for the pedestal of a statue, but its Homeric meaning of a rower's bench might justify a supposition that its employment in the Inscriptio Deliaca (cited in STUART, *Ant.*, iii, 127) was caused by the exigency of the Iambic verse. The little pedestal to a bust (Fr. *piédouche*) exists as an integral portion of the block of marble in five or six of the thirty heads at the British Museum. For examples of antique pedestals to figurines and busts, in the prints of the MUSEO ERCOLANO, some suggestions may be found. At Pompeii, a picture represents a lady making a drawing from a terminal bearded Bacchus (LIBRARY OF ENTERTAINING KNOWLEDGE, ii, 60), which is on a stand, or stool; and above her head are two representations of pedestals, the taller one carrying a vase, the shorter supporting another terminal figure, which are worth notice in considering proportions. Perhaps the bronze figure (20 inches high) of a warrior found 1824 at Pompeii on a pedestal, is engraved in the MUSEO BORBONICO with others. It has been justly observed that votive altars marked with an effigy, or with the name and attributes of a deity, must not be confounded with pedestals for statues, which they frequently resemble, even in the form of the inscription: one test, not always to be found, is in the holes for receiving the statues to be placed upon the pedestal: fr. *gaine;* and fr. *terme*, or TERMINAL. Pompeii may be consulted for the pedestal in the basilica (MAZOIS, iii, pl. 17), and for those in the area of the forum (MAZOIS, iii, pl. 39). The die of the basement to the temple therein, inclines inwards; it is moulded above and below, and in front formed into pedestals, which are oblong, and adapted to receive equestrian statues. Pedestals were also added in front at the angles of the basement of the portico; LIBRARY OF ENTERTAINING KNOWLEDGE, *Pompeii*, 1831, i, 102. REAL ACCAD. ERCOLANESE, *Pitture d'Ercolano*, fol., Naples, 1757, ii, 118, gives a picture of a statue on a pedestal, with an altar: and iii, 205, a hint of another, both pedestrian: iii, 213-27, several equestrian; and in BARRÉ, ROUX, and BOUCHET, *Herculaneum et Pompei*, 8 vols., Paris, 1837-40; vi, 109, an equestrian statue of M. Nonius Balbus, close to the theatre at Herculaneum (also MAZOIS, iv, pl. 41); vi, 153, life-size pedestrian of L. Mammius Maximus which was found with its pedestal; 165, of Claudius; and 167 of Marcus Calatorius, all of which had little more than plinths. On 13th April 1878, was discovered in one of the streets opening on S. Angelo di Peschiera, at Rome, a large marble pedestal intended to support a seated figure, which the inscription states is that of Cornelia, daughter of Scipio Africanus and mother of the Gracchi, and is probably the statue described by PLINY, *Hist. Nat.*, xxxiv, 14; he died, 79. It will be published by the Archæological commission of the municipality of Rome; ACADEMY *Journal*, 27th April 1878, p. 378.

The pedestal on the north side of the ascent to the propylæa at Athens, deserves notice on account of its large dimensions and fine position. It was built for the equestrian statues of Gryllus and Diodorus, sons of Xenophon, and altered to attribute these statues to Agrippa and Augustus. It dates about the commencement of the Christian era. At Delos was found a pedestal, which with the statue 30 ft. high, supposed from the inscription to have both been in one block, is figured in STUART, iii, 1827, pl. xxxv, p. 127:—"We are left in general ignorance as to exact character and proportions of classic pedestals. There are a few examples in the British Museum of the highest quality of Greek art; they are small and of very simple design;—it would appear as if the practice of the sculptors had desired that these pedestals should attract notice as little as possible, so as not to divert attention from the nobler work which was placed upon them. They had usually, perhaps always, a moulded capping and a plinth; but these mouldings are kept the very reverse of forcible in their effect. Even the inscriptions are tenderly treated; the letters are small, regular and uniform in size, and in form always extremely slender, and always of very moderate intaglio, presenting a singular contrast with the pompous lettering of later days. —I would request your attention to the beautiful monument of Coleone, 1495, at Venice; the pedestal is a noble example of the quatro-cento style—"; SYDNEY SMIRKE, *Lectures* 1865; in BUILDER *Journal*, 1865, xxiii, 38. In pedestals, the change from the Greek to the Roman school is noticeable for the substitution of alto for basso-relievo, as to a pedestal in the Studii at Naples; that in the Vatican Gardens, etc. Pedestals of low proportions are found in that of Marcus Aurelius at the Capitol; of Castor and Pollux also there; of the grand duke in the piazza Granduca at Florence; on the other hand, that of Bart. Colleone at Venice; in the campo S. Zani Paolo at Venice; of Gatta Melata at Padua; and king Charles I, at Charing Cross, London, are all of very tall proportion; COCKERELL, *On the Architectural Accessories of Monumental Sculpture*, read at Royal Inst. of Brit. Archts., 22 April 1861, p. 239-50. MORRIS, *On Pedestals*, in a series of articles in BUILDING NEWS *Journal*, 1871, xxi, 300 *passim;* and xxii, 40; 66; refers to a large number of instances.

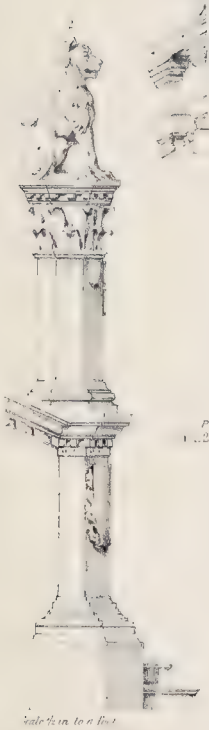
The dies of pedestals are occasionally decorated with tablets, or with sunk moulded panels; many consider these better avoided. The Trajan and Antonine columns, the Monument in London, and the column of Napoleon in the place Vendôme at Paris, have each the die of the pedestals ornamented in some way or other, to record the event of its erection. The Theodosian pedestal of the obelisk in the atmeidan at Constantinople has alto-relievos, showing the methods adopted to raise and set it up after it had been thrown over by an earthquake. Amongst modern examples of pedestals, may be cited, at Berlin, to Frederick the great; at Vienna, to the archduke Charles; at Moscow, to Minin and Pogarskii; 1862, at S. Petersburg, to Emp. Nicholas I, BUILDER *Journal*, xx, 371; etc.

PEDE WINDOW. A name suggested for certain windows at the west end, especially of the north aile, of a church, erected during the Mediæval period. In those of a date anterior to the Third Pointed period, they are almost sure to differ from every other window in the church. In the earlier periods, these west windows rarely occur; but they do at All Saints, Tinwell, Rutland, where is one of three lights, and in the apex of each is a small portion of toothed work: in SS. Andrew and Mary, Fletching, Sussex, Early Pointed, is a lancet surmounted by a square-headed window of three ogee trefoiled lights; etc. During the Middle Pointed period; S. Sampson at York, has one, of three lights, quite different to other work in the same church; as also at S. Saviour's, York; and at SS. Peter and Paul, Swaffham, Norfolk; etc. In Early Pointed work there appears to be a tendency to trefoil such lancets; and in Middle Pointed work, to cast their tracery in the form of a spherical triangle. A rose window often occurs in that position; in Sussex, in the small First Pointed churches, a rude hole has been punched through the wall. It may be surmised, that in symbolism these western windows of the ailes would represent the Saviour's feet, hence some reference to the wounds might be expected to be found, and as connected with them the three (or four) nails; at S. ....., Chaddesden, Derbyshire, they are clearly marked by the tracery; as they are also on the west façade of Lincoln cathedral. Many other references to churches, in support of the theory, are named in ECCLESIOLOGIST *Journal*, 1846, v, first Series, 164; 187.

PEDESTAL

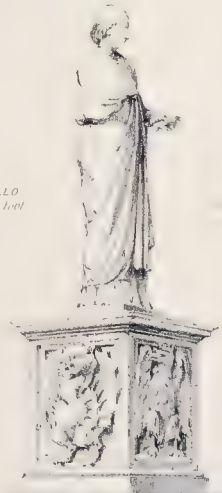


PALAZZO BOROLO TURIN



PALAZZO DEL BARGELLO
1...2 Side views of Pedestal at foot of Stairs



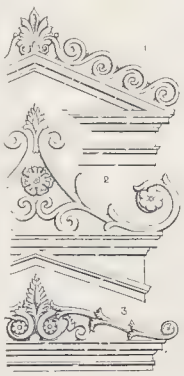




BORGHESE GARDENS ROME.

PEDIMENT (Gr. ἄετος, and ἀέτωμα; Lat. *fastigium;* Ital. *frontispizio, fastigio;* Span. *fronton;* Fr. *fronton;* Ger. *der giebel*). An English word apparently derived from "perimeter", through "periment", hence pediment; WILLIS, *Nomenclature*, 4to., Oxford, 1844, quoting the English translation of the *Hypnerotomachia*, 1592. It was later called a "tympany" by some writers. "Those roofs which exalted themselves above the cornices [in the Greek, Roman, and Italian styles] had usually in face a triangular plain or gabel within the moldings (that when our workmen make not so acute and pointed they call a Pedament), which the ancients named tympanum, but this is to be taken now and then for the whole frontispiece from the cornice to the upmost part of the *fastigium* or superior angle of it, and is commonly circumscribed with the same cornice that the subjacent order is of. It is properly placed at the front and entrance, and over the porches, windows, niches, etc., to protect them from the injuries of the weather; and therefore very impertinently broken, or flatted by some, which exposes all that is under, to many inconveniences, nor should it be at all allowed save where an absolute necessity of setting in sight (not otherwise to be had) pleads for it. Now, though they are commonly made triangular, we frequently find them semi-circular (or of some other section), whereof the base is the diameter.—Julius Cæsar being the first whom they (the ancients) indulged to raise his palace in this fastigious manner; as SALMASIUS in *Solin.* —VITRUVIUS allows neither dentils or modilions, but a simple cornice onely:—some affecting to place them according to the slope, others perpendicular to the horizon, and not to the cornice," etc.: EVELYN, *Account of Architects, etc.*, fol., Lond., 1664, p. 50 (1707, p. 49), all which precepts are still considered in force.

"The sham pediment is a mere sham, and an ugly sham"; FREEMAN, *Hist. Sketches*, 8vo., Lond., 1876, p. 156. It has been said that the entire front should be crowned with the pediment, or if that cannot be, the centre or wings should project sufficiently to be a chief feature, and each be finished with a pediment, yet even then the composition would have the appearance of being so many separate edifices, and not one design. The face of a pediment is called the TYMPANUM (AETOS); this space is frequently adorned with sculpture in figures or ornament. The crowning decoration at each angle and on the top is called an ACROTERIUM. EYE. GABLE is the term used for a similar termination to a wall in mediæval architecture.



The woodcut represents what is supposed to be meant by VITRUVIUS, vii, 5, when using the term Harpaginetulus, as described herein, s. v. Figs. 2 and 3 are made up from a painting discovered at Resina, which may be assumed to be merely a decorator's application of a system of ornament like that of fig. 1, an example at Aizani.

SERLIO, *Architettura*, fol., Venice, 1619, first edit.; 1663, p. 265, 301, was perhaps the earliest to give as a rule for the height of the pediment to an opening, that it should come within a segment drawn from a point on the centre line, with the half distance between the tangents; he gives another rule, from a point obtained by the whole distance down the centre line of the detail. The following work, L'EVEILLÉ, *Considerations sur les Frontons*, 4to., Paris, 1824, has been translated in *Detached Essays*, 1848-49, with plate. HUGGINS, *The Form, Treatment, and Application of the Pediment*, read March 1852, at the Liverpool Architectural Society, *Proceedings*, ii, 229-38. All the writers on Architecture of the Revival from ALBERTI to CHAMBERS have treated on Pediments. "It would be interesting to examine the relative inclination of the pediment with the horizontal cornice in the various Greek temples, and to ascertain the variation which took place in the different styles and under peculiar circumstances"; DONALDSON, *Bassæ*, in STUART, etc., *Antiq. of Athens*, fol., Lond., 1830, iv, 11.

The ALLGEMEINE BAUZEITUNG, 1837, pl. 127-31, gives the details of the construction of the pediment and portico of the Parthenon. PATTE, *Mémoires*, 4to., Paris, 1769, pl. 27, p. 352, gives the construction (*armatures de fers*) of the pediment proposed by Servandoni for the église de S. Sulpice: and in *Etudes*, fol., Paris, 1755, pl. 17-8, that of the peristyle of the Louvre. RONDELET, *Mémoire sur le Dôme, etc., du Panthéon Français*, 4to., Paris, 1797, pl. 6, gives that of the peristyle of that building.

Buontalenti (1535-1608), in his *porta delle suppliche* under the vault of the *ufizi*, at Florence, has introduced as an invention of his own, the broken and reversed pediment with a bust placed on a corbel in the centre; RUGGIERI, *Studio d'Archit. Civile*, fol., Flor., 1722, i, pl. 35. This fancy was largely carried out by Borromini and architects of his time; it has been commented upon by GALLACCINI, *Trattato sopra gli Errori degli architetti*, fol., Ven., 1767; and by VISENTINI, *Osservazioni sopra gli Errori, etc.; continuazione*, fol., Ven., 1771. LANGLEY, *Builder's Assistant*, 8vo., Lond., 1738, *Broken or Open Pediments demonstrated*, pl. 48-9. 1. 5. 7. 14. 16. 25.

PEDNELISSUS. An ancient place supposed to be represented by the modern village of Bolcascooe in Pamphylia, on a hill above which are extensive ruins of mixed Greco-Roman architecture, comprising the remains of an aqueduct; a kind of stadium with a very high screen wall at the end, and a colonnade with a balcony and niches, of which the plastering had been coloured blue (only a few columns are standing); a theatre, of which the seats, the steps, the floor of the area, and the side doorways, with the lobbies and rooms, are all still very perfect. The proscenium has a number of square niches and white marble porticoes and arches. There are other ruins of the same age; FELLOWS, *Asia Minor*, 8vo., Lond., 1852, p. 147-9.

PEDOLO (GIUSEPPE), a good *proto-muratore*, reduced in the XVIIIth cent. the church dei SS. Apostoli at Venice, to its present form; SELVATICO, *Archit. in Venezia*, 8vo., Ven., 1847, p. 472.

PEDRAJA (BARTOLOMÉ), a native of Otero, "constructed" eight chapels in the cathedral of Segovia, assisted by B. Eloriaga He was *destajesta* in the Escurial; and designed 1591 the church of Espinar. 66

PEDRO (JUAN GARCIA DE SAN), *maestro de obras* of Toledo, designed the church of the Trinitarios Calzados in that city, which was begun 1628. On 24th July 1636, F. de Espinosa, *maestro de obras* of Toledo, contracted with the superior of the monastery to complete the edifice by 15th August 1637; but dying, his widow directed Juan to carry out the contract, except as to the cupola, which was not finished until 1693, when the church was consecrated. 66.

PEDRO DE SAN NICOLAS. A pupil of L. de S. Nicholas, executed the church of the monastery of the descalzes Augustinas, at Salamanca, designed by his master between 1612 and 1664. O. (J. DE N. S. DE LA). 66.

PEDROSA (JUAN DE LA). Although he did not obtain the post of *maestro mayor* to the cathedral of Toledo, he was called upon by the chapter of that city to give his advice in the work of the *ochavo*, or octagonal portion of the Lady Chapel, with F. Bautista, P. de la Torre, and J. de la Torre. That of Pedrosa was adopted 1647, and only partly executed by him in consequence of his death, when it was completed 1653 by F. Lazaro de Goyti. 66.

PEE, a chief city of the Birman Empire; see PROME.

PEEL, formerly called Sodor, and also Holm Peel. A town situated on the west coast of the Isle of Man. It has a strong ruined castle, with walls. A good description is given in SCOTT, *Peveril of the Peak*, note v. The cathedral of S. Germanus, situate within the walls, was erected about 1245, and is now only used as a burial place. It consists of nave, ailes, transepts, choir, and chapels, beneath one of which is a crypt having 13

columns. The windows being wide with flat arches, are peculiar, and resemble those in early French churches: (NEALE), *Eccles. Notes on the Isle of Man, Ross, Sutherland, and the Orkneys*, 12mo., Lond., 1848. The church of S. Patrick was probably built before the Norman conquest; it is now very much ruined; near it is a lofty round tower. The buildings are chiefly erected of clay slate faced with brilliant red sandstone from quarries in the neighbourhood, but now only used for window-stools and door-steps. POOLVASH LIMESTONE.

PEEL, Pile, Pille, Pill, Pele, Peyll, Peill, and Paile. A word derived from the ancient Brit. and Gaul. *pill*, a stronghold, fortress, secure place. There is the Pile of Foudray in Furness; Peel Castle, Isle of Man; Pill, in Devon, etc. The Glossary of the *Waverley Novels*, Edinburgh, 1847, v, describes it as "a place of strength, or fortification, in general. In particular it signifies a stronghold, the defences of which are of earth mixed with timber, strengthened with palisades. Peel, Peel-house, in the border counties, is a small square tower, built of stone and lime." *Pela*, castellum, arx, DU CANGE; Castra pela et fortalicia, RYMER, *Fœdera*, iv, 486; viii, 95: an earthern tower (LESLY, *De Orig. Scot.*; a strong tower of pyramidal form entirely of earth, p. 57-8); a wooden tower, R. BRUNNO, 157: a small tower not strong enough to resist a siege, but not so weak as to be delivered to a demand. FABYAN, *Chron.*, states that William Rufus "buylded in sundry places (in Wales) strong castles and pyles, by meane whereof more and more they were plucked to obedyence." The term is used chiefly in Scotland, in the border counties; and even in the more peaceful districts of England, many houses were built after their fashion. "These towers, built against depredations by the kings of Scotland on the lower parts of the river Tweed, were continued by the landholders, along the higher parts of it, etc. They were built of stone and lime in the best manner, and consisted commonly of three stories, the lower one on the ground floor vaulted, for horses and cows in times of danger; the great hall above it in which the family lived; and the highest for the bedchambers for public as well as for private safety. They were by general consent built alternately on both sides the river, and in continued view of one another. A fire kindled on the top of one of these towers was the known sign of an incursion of the enemy; the smoke by day, the flame by night, over a tract of country of 70 miles long from Berwick to the Bield, and 50 miles broad": FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1805-8, ii, 187, who names the towers along the Tweed for 10 miles above and below Peebles. RIDDEL, *Ancient modes of Fortification in Scotland*, in ARCHÆOLOGIA, 4to., Lond., 1792, x, 99-104. In Scotland, peels were built as late as XVIth century in close imitation of a Norman keep. The peel or fortalice of the Middle ages at Darnick was restored to a habitable state as a dwelling; it has been one of the best preserved in the south of Scotland, while the contemporary ones of Colmslie, Hillslap, Langshaw, and Torwoodlee have fallen into ruins; of those of Buckholm, Blindlee, Langlee, Gala, and others, not a vestige remains. That at Darnick has four floors with an apartment on each; the original doors and locks are still in use, the former being studded strongly with great iron nails, and the latter of vast size: BUILDER *Journal*, 1861, xix, 471. *Northumbrian Peles, idem*, 1863, xxi, 198-201, which also, 909, illustrates Ancroft church and its peel tower, *temp.* Edward I, II, or III, as a curiosity; the Early English tower of Long Houghton church, Northumberland, was the substitute for a peel to the neighbouring inhabitants.

Hellifield peel or castlet, in Yorkshire, built by licence 19 Henry VIth, 1440-41, is a square compact building of three floors; as shown in a plate in WHITAKER, *Craven*, 3rd edit., 4to., Leeds, 1878, p. 153. TURNER and PARKER, *Dom. Arch.*, 8vo., Oxford, 1853, ii, 11, notices the towers at Corbridge, Northumberland, *temp.* Edward I, wherein the ground room was vaulted, the two upper stories had timber floors; and the staircase was in the thickness of the wall. At Yanwath, the tower is of the XIV cent., with later additions around. They then describe the "tower built houses", as Dacre castle, Cumberland; Langley castle, Northumberland; Nunney castle, Somersetshire; and 1433-55 Tattershall, Lincolnshire; and Middleton tower, Norfolk, both of brick; Cresswell, Northumberland (p. 199); Belsay, Northumberland, erected shortly before 1317: it is 56½ ft. by 47 ft. 3 ins. (p. 205). In iii, 8-9, they state that the border manor house or Pele tower was built in the XV, or even XVI cent., exactly after the original models, which had existed from the earliest times—the tower of Kirk Andrews-on-Eske, Cumberland, shows the parapet and cornice with gurgoyles, of the XIV cent. The prior's house at Hulne abbey, Northumberland, 1489, is a regular peel (iii, 202). Throughout Ireland, these "tower houses" are extremely numerous; they were the manor houses of the middle ages—from the XII to XVII cent., and the stonework generally is in good preservation—they differ from similar tower houses in England and Scotland, having a distinct national character—(iii, 10). 17.

PEELE. At the hearing before the City authorities of the differences between the carpenters and joiners, Sept. 1632, the decision states, "item the shelving in a kitchin with racks for spitts and other racks for hanging vpp of furniture except all peeles", belonged to the carpenters; and "all peeles not made of waynskott have alwayes belonged vnto the carpenters"; JUPP, *Carpenter's Company*, 8vo., Lond., 1848, p. 298; 302. This passage has proved difficult of explanation. A baker's peel, with which he puts in and takes out articles from the oven, may be meant; or "the instrument of about a yard and a half long and three quarters broad, on which pastry cooks put pies and tarts, etc., at once, either to carry them from gentlemen's houses to be baked, or from the oven to where they are to be used at feasts, etc.", as explained in BAILEY, *Dict.*, 1736; and HALLIWELL, *Gloss.* The printer's peel is used for hanging up sheets of paper to dry upon lines or rails fixed near the ceiling of his workroom.

PEER (Fr. *piédroit*), so written in 1703-36 for PIER. 4.

PEG (Fr. *broche*, a level peg). A small pointed piece of wood for several uses; also a wood pin turned with a kind of round head, for hanging up of hats, clothes, etc. 4.

PEGASUS. A winged horse, that lived in the palace of Zeus, for whom he carried thunder and lightning; later writers describe him as the horse of Eos: and lastly, and in more modern times, as the horse of the muses, the well Hippocrene rising out of mount Helicon from a kick given to it by Pegasus. This horse is often represented in ancient works of art, and on coins, along with Athena and Bellerophon: and is said to have represented Satan, in a fresco by Chelini, *cir.* 1444, on the façade of the ospedale del bigallo, at Florence. 59.

PEGOLA, or Greek pitch, Colophony, and other names, was only the resin left by boiling crude turpentine. DIDRON, *Manuel d'Iconographie, etc.*, 8vo., Paris, 1845. MERRIFIELD, *Arts of Painting*, etc., 8vo., Lond., 1849.

PEGU or PEGOO, and BAGOO. A city of the Birman empire, situated on the eastern banks of a river, which about 90 miles below joins the Syrian or eastern branch of the Irawaddy near Rangoon. It was taken 1757 by Alompran king of the Birman empire, when every private dwelling was razed to the ground. His successors built a new town, which was visited 1796 by SYMES, *Embassy to Ava*, 12mo., Edinburgh, 1826, who describes the ancient town as a quadrangle, each side being 1½ miles, and showing the remains of a ditch and wall. The numerous temples were spared; the most famous is the Shoe Madou or Shoëmadu, the golden dwelling of the god; it is 361 ft. high above the country, and consists of two terraces 10 and 20 ft. high, and 1,391 ft. and 684 ft. square; the temple or pagoda on the top platform is somewhat "polygonal", of brick and shell mortar, 395 ft. diam. (each side of the "octagon is 162 ft.), and without a cavity; it returns to a circular form, and is crowned by an iron spire or *tee* or umbrella, 56 ft. circum., richly gilt, rising 331 ft. above its terraces; round the lower rim of the umbrella are appended

a number of bells—of different sizes: around the base are 108 or 110 small pagodas, each 27 ft. high. Asiatic Researches, 4to., Bombay, 1792, v, 116: Elmes, *Lectures*, 8vo., Lond., 1821, p. 125-8: and Fergusson, *History of Indian and Eastern Arch.*, 8vo., Lond., 1876, p. 621, who considers that it assumed its present form in the XVth or XVIth centuries; the iron tee is said to have been put up as late as at the visit by Symes.

The teak forests of Pegu are noticed as of value in Building News *Journal*, 1874, xxvi, 364. Teak. 14. 50.

PEISISTRATOS or Pisistratus, born about B.C. 612, was the celebrated tyrant of Athens B.C. 560-527 and succeeded by his two sons. His policy and taste, combined, led him to employ the poorer Athenians in building; thus at Athens he erected many stately and useful edifices, as a temple to the Pythian Apollo; a magnificent temple to the Olympian Zeus, on which were employed the architects Antistates, Callæschrus, Antimachides, and Porinus (it was reconstructed by the emperor Hadrian): he also erected the lyceum, at a short distance from the city; formed the fountain of the nine springs, etc. Beulé, *L'Arch. au siècle de Pisistrate*, in Daly, *Revue Générale*, 4to., Paris, 1857-8, xv, and xvi, *passim*.

PEKEA TUBERCULOSA; see Caryocar.

PEKIN and Peking, *i.e.* "north capital"; the ordinary name is TA TU or "great residence". It is situated at the northern extremity of the country, in the province of Pe-che-li. About 1264, Kublai khan fixed his court there, and it became the capital and seat of government, since about 1420 under the Ming dynasty, of the Chinese empire. The nucleus of the city consists of the imperial palace, about 2 to 2½ miles in circumference. On the north of the palace is an artificial hill of coal about 150 ft. high, covered with soil, and planted, and having pagodas and shrines upon it; north-west of it is the white Ming pagoda. The whole is surrounded by the imperial town, which has a wall about 6 miles in circumference; around this again is the Tatar or Manchoo town, whose wall is about 16 miles long; to which on the south is joined the Chinese town, having an additional eight miles of wall: both are of brick of a blue colour, and of great thickness, built 1437-39, the top affording a wide means of communication; square towers projecting many feet occur at frequent intervals; the outer gates have each a large watch tower three stories high; a view of one is given in Michie, which with Simpson, *Meeting the Sun*, p. 130-43, 176-99; and his *Architecture of China*, read at the Royal Inst. of Brit. Archts., 1873-74, p. 37, are among the latest and most trustworthy accounts of this city: the latter describes Pekin as "only an extended village of dirty streets and crumbling walls; all the houses are made to face the south"—and gives a rough plan of it, p. 133. A considerable portion of the area is devoted to gardens, squares, ponds, and fields. The buildings belonging to the emperor, his temples and altars, have roofs of four slopes covered with yellow tiles, yellow being the imperial colour; the northern altar of the temple of Heaven is an exception to this rule, its triple roof being covered with tiles of a deep blue: the buildings of the princes are covered with green tiles; all the other houses with grey tiles: the other temples and convents are mostly painted red.

The Tatar town contains, in the north-east quarter, Wen-miao, a Confucian Temple, a noble building and kept in perfect order, and has a magnificent ceiling. There is also Ti-wang miao, the imperial Confucian temple; the Lama temple or monastery including a vast range of buildings; a Thibetian monument in the temple is given by Michie; and a gateway by Fergusson, p. 693, from a photograph by Beato; and other buildings.

The Chinese town contains the principal altars on which the emperor presents his offerings. These are the Tien-tan, or temple of Heaven, with its north and south altars (Simpson, p. 177), situated on the east side of the main central street; and the temple of Agriculture or altar of the Earth, on the west side; Michie, describing the first-named temple, writes, "The great centre pavilion (of timber) with its blue roof and large gilt top, is the most conspicuous object in all Peking. Opposite to it and on the right is the temple or altar of the Earth (which is square)." A woodcut is given in Michie, and also in Fergusson, *Indian and Eastern Arch.*, 8vo., Lond., 1876, p. 690. Both temples are described in Simpson, p. 40-3; and in his book, p. 187; and are said to have been built about 1420. Joseph Edkins has drawn from Chinese sources descriptions of these buildings, which are printed, with an account of the city, in chapter xvi of Williamson, *Journeys in North China*, etc., 8vo., Lond., 1870, p. 313-92.

At the village of Ken-yung-Kwan, in the Nan-Kow pass leading to the great wall, there is an arch bearing the date of 1345: it is Buddhist and has an inscription in six forms; its ornamentation is identified by Fergusson, *Indian Arch.*, 1876, p. 709, with some still existing in Nepaul.

Simpson, in his paper, gives an elevation and plan of the tomb of Yung-lo (died 1425), of the Ming dynasty, situated 40 miles north of Peking. The emperor's summer palace and gardens at Hai-teen, usually called Yuen-min-yuen, are situated about ten miles from Peking; the palace was looted and burnt by the English and French on the 7th and 8th Oct. 1860. Two views are given in Michie. J. D. Attiret, *Account of the Emperor's Gardens near Pekin*; transl. into English, 8vo., Lond., 1752; republished in North China Herald, No. 536, for 30 Nov. 1860: with another description by one present at the attack: Builder *Journal*, 1861, xix, 11. Knollys, *Incidents in the Chinese War of* 1860, 8vo., Lond., 1875.

Hyacinthe, *Descr. de Peking, traduite du Chinois*, Petersb., 1829. Du Halde, *History of China*, 8vo., Lond., 1736, now out of repute. Staunton, *Embassy to the Emperor*, 4to., Lond., 1797. Barrow, *Travels in China*, 4to., Lond., 1804. Gutzlaff, *China Opened*, 12mo., Lond., 1838. Davis, *The Chinese*, 12mo., Lond., 1844, new edit., ii, 71-94. Wright and Allom, *China*, 4to., Lond., 1843, iii. Martin, *China*, 8vo., Lond., 1847. Michie, *The Siberian Overland Route*, 8vo., Lond., 1864. Building News *Journal*, 1857, iii, 156. S. Wells Williams, *The Middle Kingdom*, 12mo., Lond., 1848. Simpson, *Meeting the Sun*, etc., 8vo., Lond., 1874. Gray, *China*, etc., 2 vols., 1878, with 120 illustrations. 14. 50. 72.

PELASGI; The. A people of wide diffusion, but it is a vexed question as to the quarter from whence they came. Niebuhr, *Hist. Rome*, 8vo., Stutt., 1830-42, i, 52, observes, "there was a time when the Pelasgians extended from the Po and the Arno, almost to the Bosphorus." The Greek traditions represent the Peloponnesus as the original seat of the Pelasgians, whence they spread to Thessaly, and thence to the islands of the Grecian archipelago, and to the Asiatic coast. Clinton, *Fasti Hellenici*, 4to., Lond., 1834-51, i, 1-30, places, p. 14, their migrations in the following order: 1, Lycia and Lesbos; 2, two generations later, to Thessaly; 3, to Arcadia; 4, two generations later, to Italy, in the southern part of which they widely spread themselves.

"The primitive history of Greece is the primitive history of India", writes E. Pococke, *India in Greece*, 8vo., Lond., 1852, p. 27, etc. Dennis, *Etruria*, 8vo., Lond., 1848, i, xxxi; who, ii, 282, considers the Pelasgi entered Italy at the head of the Adriatic, and crossing the Appennines, took possession of Etruria, driving out the earlier inhabitants (the Siculi or Umbri, two of the most ancient races of Italy), raised towns and fortified them with mighty walls, and long ruled supreme, till they were in turn conquered by a third race, called by the Greeks Tyrrheni, or Tyrseni, by the Romans Etrusci, Tusci, or Thusci, and by themselves Rasena, about 290 years before the foundation of Rome, or 1044 before Christ.

"To comprehend the arts of Greece, it is necessary to bear in mind that the country was inhabited by two distinct and separate races, the one aboriginal, as far as we know, which for distinction's sake may be called Pelasgic, a race which not only spread over Greece, but Etruria and Asia Minor, and before the

war of Troy was generally the dominant race in all these countries. In Greece their power became extinct with the return of the Heraclidæ to the Peloponnese in the XIth cent. B.C.: FERGUSSON, *Handbook*, 8vo., Lond., 1855, i, 255-61.

The Pelasgians are mentioned by STRABO, THUCYDIDES, HERODOTUS, ÆSCHYLUS, DIODORUS, and DIONYSIUS. MARSH, *Horæ Pelasgicæ;* NIEBUHR, *History of Rome*, i, p. 25-62; MALDEN, *Hist. of Rome*, p. 69-83; THIRLWALL, *Hist. of Greece*, i, 32-62; WACHSMUTH, *Hellenische Alterthumskunde*, 8vo., Halle, 1846, i, pt. 1, s. 9; CURTIUS, *De Antiquis Italiæ Incolis*, s. 6, 7. KRUSE, *Hellas*, i, 404. LLOYD, *The Age of Pericles*, 8vo., Lond., 1875, i, 176. FREEMAN, *Hist. of Arch.*, 8vo., Lond., 1849, p. 35, etc. R. F. BURTON, *Etruscan Bologna*, 8vo., Lond., 1876, p. 172-4. GROTE, *Hist. of Greece*, 8vo., Lond., 1862. 14.

The works of this race are considered s. v. POLYGONAL WALLING. CYCLOPÆAN WORK. DRYOPIC BUILDING. ETRUSCAN ARCHITECTURE. GREEK ARCHITECTURE. ITALIAN ARCHITECTURE. OSCANS.

PELE TOWER; see PEEL TOWER.

PELICAN. A bird which has been introduced as a symbol of charity, and generally represented "vulning herself", that is, wounding its breast to feed its young with its own blood: a tale told in the fabulous natural history of the middle ages, which made the bird the adopted symbol of the Redeemer. In crucifixes, the lamb is at the foot, and the pelican at the top, of the cross. This bird is represented on early Christian tombs, and others of later date. A pelican occurs on the top of a carved wood cover to the font in Ufford church, Suffolk; and another over the font at North Walsham, Norfolk. PUGIN, *Ecclesiastical Ornament*, 4to., Lond., 1846, pl. 61. 17.

PELEGRET (TOMAS), of Toledo, studied in Italy under B. Peruzzi and P. Caravaggio; on his return to Spain probably about 1530, he settled at Zaragoza, where he decorated the façades of many palaces and churches with architectural paintings, now nearly all destroyed, in the style of his masters. At Huesca about 1550 he painted the sacristy, etc. He died at 84 years of age, but the year is not given. 65.

PELLEGRINO (GALEAZZO), designed 1490 the tomb of Giovan' Galeazzo, the founder of the certosa at Pavia; it was not completed until 1562; it is of the richest cinque-cento work. 28.

PELLEGRINO (GIACOMO), rebuilt in XVIth century the church of S. Sisto at Genoa, consecrated 1828.

PELLEGRINI (GIAMBATTISTA), practised at Genoa, where 1780 he restored the palazzo Serra in the piazza dei Banchi, designed by G. Aicardo; and 1786 restored the palazzo Serra, previously Selvago and then Spinola, near Sta. Sabina, for the family Rebuffo; a work by G. Alessi, with a vestibule by A. Tagliafico. *Manuale di Genoa*, 16mo., Genoa, 1846.

PELLEGRINI (P. DE'); see TIBALDI (P. and D.).

PELLESINI (LELIO), born 1602, in Leonato, in the province of Brescia. He designed and superintended the parochial church of Avi; and 1627 commenced that of S. Nicolo of the padri Teatini in Verona; the tabernacle was by C. G. Guarini.

VINCENZO, his son, born 1637 in Verona, and instructed by his father, was 1667 associated with him in building for the marchese Luigi Canossa, the portion of three floors, which commencing from the ancient palazzo Canossa upon the corso, extends to the Adige, and the loggia upon the river. In 1670, he built the edifice of S. Giovanni, or S. Zeno on the Hill, for the college of the nobles, of the princes Somaschi; in 1675 added the stables and coach-houses; in 1678 the church at S. Grezano; the new *sborro*, attached to the old one, for the purification of foreign merchandise; 1683, the vaulting of the church of S. Nicolò, which had been commenced by his father; 1687 the oratory of Sta. Maria della Giustizia, called La Disciplina; and 1692 the palace and the church of the counts Maffei, at Valezo: in 1694 the palace with its landing place (barchessa) for sig. Alvise Mocenigo, at Villabuona alle Valli. Subsequently he assisted in the restoration and adornment of various palaces, namely, that of the counts Emilii, and the neighbouring church of S. Biagio; of the counts Zanobii, and Rizzardi, at S. Marco; and 1699 of the count Alessandro Pompei agl' Illasi. He died in 1700, leaving two sons,—Lelio, who studied painting and music; and Gabriel, who applied himself to topographical drawing and hydrostatics. MAFFEI, *Verona Illustrata*, 8vo., Ver., 1771, ii, 63. *Verona, Notizie*, 8vo., Ver., 1795, p. 85. 39.

PELLETIER (JACQUES), was at work 1554 at the hôtel de ville at Cambrai. *Revue des Soc. Sav.*, 2nd series, v.

PELLET MOULDING. A band ornamented with small flat discs; used in Norman architecture. 1.

PELLEVOISIN or PELVOYSIN (GUILLAUME DE), born 1477, established himself at Bourges, paroisse du Fourchault, became master mason to the chapter of the cathedral of S. Etienne, and built 1515 the hôtel Salvi, then the house 1522 of the professor Jacques Cujas, then the hôtel dieu, and now the *caserne de gendarmerie;* and the church of Nôtre Dame, formerly St. Pierre du Marché. He was inspector of the works at the rebuilding, 19 Oct. 1508-38, of the northern tower, called the *tour de beurre*, of the cathedral, which had fallen down 31st Dec. 1506; the architects in chief being Colin Byard and Jean Cheneau. In 1515 he had taken their place. He died about 1550, and was succeeded by Eugène Bernard; COMITÉ HIST., etc., *Bulletins*, 8vo., Paris, 1842-3, p. 469-70. GIRARDOT et DURAND, *Art. de Bourges*, in *Archives de l'art Français*, Ser. 2, i, 1861. LANCE, *Dict. Biog.*

PELORO (GIOVANNI BATTISTA), of Siena, was a pupil of B. Peruzzi, studied mathematics, etc., made plans for numerous fortresses, and a model of the city of Siena and for about a mile round; he went to France, and followed the court for a long time; but died at Avignon, having been chiefly employed in making designs, fanciful inventions, admeasurements of buildings, and models; VASARI, *Lives*, 8vo., Lond., 1851, iii, 172.

PELOURINHO. A pillar set up in the market or other principal place of a town or city in Portugal, to show that the corporation was invested with municipal rights. It generally consists of a column, more or less ornamented, and raised on several steps, and may be easily mistaken for a mutilated cross. It was furnished at the top with four iron branches, having at each extremity a ring and a chain for supporting the heads of criminals after decapitation, but at Lisbon, an armillary sphere is now substituted for them. The column at Fuentenovilla is illustrated in BUILDER *Journal*, 16 Nov. 1878, p. 1200. 28.

PELUSIUM. An ancient city of lower Egypt, situated upon the easternmost bank of the river Nile. It was the SIN of the Hebrew Scriptures. As the river became choked by sand, the city, even in the third cent. A.D., was at least 4 miles from the Mediterranean. Its position as a border fortress, as regarded Syria and the sea, and as a place of great strength, rendered it often exposed to attack. Its ruins, which have no particular interest, are found at Tineh or Teeneh, near Damietta. CHAMPOLLION, *L'Egypte*, ii, 82; DENON, *Descr. de l'Egypte*, i, 208; iii, 306. CASSAS, *Voy. Pitt.*, fol., Paris, 1799, iii, pl. 95, gives a view of a restoration of a temple near the site of the ancient Pelusium. 23. 28.

PEMBROKE (RICHARD DE), *custos* and subsequently comptroller of the works at the palace at Westminster and the tower, when he was paid 6d. per day from 6 Jan. 2 Edward III to 2nd August (1329). BRITTON and BRAYLEY, *Palace*, 8vo., Lond., 1836, p. 199; 201; 244.

PEMBROKE, Earl of; see HERBERT (HENRY).

PEN. The return side of the claw of a hammer; MOXON, *Mech. Exercises*, 8vo., 1694, p. 123.

PEN. An instrument used in writing and sketching, formerly made of a reed, but the quill has been used in England for about 500 years: these are now nearly superseded by the "steel pen". The Egyptians used a reed pen or goose quill for writing on papyrus; while the *stilus*, or *graphium*, a pointed instrument, was used by the nations of antiquity for inscribing

or writing on their waxen tablets. The mediæval writers used the quill of various kinds, and the drawings by Albert Durer show the use of ruling and bow pens; the lines of operation being scratched on the paper. Bow-pen. 6. 14.

PENA (Pedro de la, and Gaspar de la), cousins, executed 1653 the southern side of the cloister of S. Felipe el Real at Madrid: and about 1650 executed an oval chapel in the mother church of Sta. Maria de la Almudena and of the Virgin, formerly a mosque, at Madrid. 66.

Gaspar, *maestro mayor* of the duke of Olivares, residing at Cordova, was 1660 called upon by the chapter of Seville, together with F. Diaz, to report upon the *sagrario* added to the cathedral: and was also engaged on the completion 1604-64 of the sixth storey of the tower of the mosque. 66.

PENACCHI (Girolamo), also a painter, usually known as Girolamo da Trevigi, and called Jerome di Trevisi by Walpole, *Anecdotes*, was born in 1508. His father, Pier or Pietro Maria Penacchi, was a painter of Treviso. At Bologna the son designed the façade of the palazzo Leoni now Sedazzi; leaving that city and "thence repairing to England he was recommended to king Henry VIII, and at once appointed to the service of that monarch, who employed him not as painter, to which his eminence in his native country, as at Trevigi, Bologna, and Trento, was due, but as engineer. Having given proofs of his ability in various edifices copied from such as he had seen in Tuscany and other parts of Italy, which were approved by the king, he rewarded him with large gifts, and ordained him a stipend of four hundred crowns a year, giving him at the same time opportunity and permission to erect an honourable abode for himself, the cost of which was borne by the king. He was killed in the English batteries against Boulogne in Picardy in 1544, and was apparently succeeded in the king's works by John of Padua. "It was from the contemplation of the new style of defences to the city of Treviso by fra Giocondo, 1507-9, that Penacchio derived that great knowledge of engineering and military architecture which entitled him to the esteem of a king of England;" Marchese, *Lives*, 8vo., Dublin, 1852, ii, 160. Ridolfi, *Vite de gl' illustri Pittori Veneti*, 4to., Ven., 1648, p. 214. Federici, *Memorie Trevigiane*, 4to., Ven., 1803. Giordani, *Memorie, etc., la chiesa della Madonna*, 8vo., Bolog., 1851. Vasari, *Lives*, 8vo., Lond., 1851, iii, 285-9. 3.

PENAFREYTA (Pedro de), was magister operis at the cathedral of the Virgin at Lerida in Spain, and was probably employed on the central lantern, and the "enormous" cloister at the west end begun before 1215. He died 1286. Villaneuva, *Viage Lit. á las Iglesias de Espana*, xvi, 83; Street, *Gothic Arch.*, 8vo., Lond., 1865, p. 349, 452.

PENALTY.—"The question of the difference between penalties and liquidated damages is very nice and intricate."—"Those payments which architects are in the habit of calling penalties are not so, strictly speaking. If they were, they could not be recoverable in a court of law, and a court of equity would relieve against them."—"The courts will enforce, as far as possible, the assessment of damages, which the parties have assented to, but they will not allow one party to impose a *penalty* on the other." Detailed information on this subject is given in Jenkins and Raymond, *Building Contracts*, 8vo., Lond., 1873, p. 90, etc. Liquidated and Stipulated Damages. 14.

PENANCE CHAMBER, or penitential cell.

PENARIA, cubicula, or cellæ domesticæ. The apartments on each side of the cavædium, or entrance court, of a Roman house. Grapaldus, *De Partibus Ædium*, c. iv. 1.

PENATARAN, in Java. The extensive ruins at this place are described by Raffles, *Java*, 4to., Lond., 1817, p. 38-41.

PENATES; Ædes penatium. A building situated on the Via Sacra in the forum at Rome; and so called by Canina, but of Vesta by Bunsen, by others the temple to Remus; and also the temple of Romulus, the son of Maxentius. It appears on the Capitoline plan. It is a circular building of imperial times, about 30 ft. in diameter. Parker, *Roman Forum*, 8vo., 1876.

PENCHAUD (Michel Robert), born 24th Dec. 1772 at Poitiers (1775 in Gabet), was a pupil of Percier. He assisted his father in building the château de Verrière for the duke de Mortemart; and that of Dissais for the bishop of Poitiers. In 1803 he was appointed architect-director of public works to the town of Marseilles; shortly after, architect to the chambre de Commerce, and directeur des travaux publics du département Bouches-du-Rhône. At Marseilles he designed 1803-10 the *jardin botanique*, and the adjoining stone bridge; 1808 the promenade and fontaine à Monthion; 1820-23 the large caserne de Gendarmerie, and maison d'arrêt; 1823-32 the triumphal arch, now the porte d'Aix; the entrance pavilion of the (collège royal now the) lyceum; la porte majeure and the extensions 1824-26 of the lazaretto on the île de Ratoneau in the rade de Marseille and all its maritime buildings; the chapelle du port Dieudonné; 1824-6 the temple des Protestants; 1835-38 the hospice pour 356 aliénés, put off by the revolution of 1830; the large hospital on the quay for the treatment of the yellow fever; gave designs for the restoration of the hôtel de la préfecture des Bouches du Rhône, which were executed by — Michaud; and executed the paving of the principal streets, with the water supply. For Aix he designed 1813-31 the maison d'arrêt et de justice; the façade of the depôt de mendicité; and 1822-32 the palais de la cour d'appel et des tribunaux: at Orgon, the maison de dépôt: at Saint Remi, 1820-27 the église majeure: at Tarascon, 1825 the abattoir: and at Draguignan, 1824 the palais de justice; the adjoining buildings being by Baltard and Lantoin. The maison d'arrêt for the arrondissement de Marseilles is also named as by him.

He made 1810 by order of the government drawings of the exact state of the maison Carrée at Nismes, and plans, etc., for its restoration, which were approved; the 30 sheets and a memoir were deposited in the archives of the académie des Inscriptions, etc. In 1832, on being suddenly dismissed from his appointments, he went to Paris, where he died 22nd December of the same year. From Daly, *Revue Générale*, 1842, iii, 125, it appears he had a son, also in the profession. Gourlier, *Choix d'Edifices*, fol., Paris, 1825-50, ii. 110. 112. 113.

PENCIL. The *Jurors' Reports* of the Exhibition of Industry of All Nations, 1851, p. 3, describes the ingenious method patented by W. Brockedon for making the powder of pure graphite into a block without cementing it by any substance. Builder *Journal*, 1861, xix, 537. 14. 6.

"A pencil or drawing tool used by plasterers or bricklayers in blacking the bottoms or lower parts of rooms, etc." Moxon, *Mech. Exercises*, 4to., Lond., 1700, p. 13.

PEND. A Scotch term for an arched roof of masonry, but not groined. One covered with flagstones, at Seton church, is noticed by Grose, *Antiq. of Scotland*, i, 66. Roofs entirely constructed with stone were anciently common in Scotland and in Ireland. Pen-stone. 19. 22.

PENDANT, also written Pendent (from Lat. *pendens*, hanging; Fr. *clef*). This term originally meant, not the bosses of a vault, but the sloping face of the vault between the ribs (Fr. *pendentif*). This is important, as there is no word to express the latter; Ecclesiologist *Journal*, 1846, ii, old series, 170. 16.

The term is now usually given to an ornament projecting downwards from a roof or a ceiling: boss; knottys. It is generally an elongated post or a keystone; as at Eltham palace, Crosby hall, Westminster hall, Wollaton hall, etc. In stone, it occurs in Henry VIIth's chapel at Westminster (Gwilt, *Encyc.*, 1876, p. 594), where, by prolonging a particular stone, it forms the springer for a smaller series of arches forming the panelled and trefoiled van vaulting. A valued example of a pendant keystone in vaulting occurs in the Lady chapel at Caudebec, in Normandy (Gwilt, p. 388, 592, 1012; Pugin, *Antiq. of Normandy*), where it is 17 ft. 6 ins. long. There are many fine examples of pendants in the Renaissance works

in the north of France and in Burgundy; at Chambord, Blois, etc.; at Noyon cathedral: and especially the church of Tillieres-sur-Avre. Architect *Journal*, 1849, i, 326. Nodier and Taylor, *Voyage Pitt.*, etc. (Picardie), fol., Paris, 1845, iii, illustrates those in Senlis cathedral.

In the Ely Sacrist's accounts 1322, the sum of 8s. 9d. is charged for the carriage of stone from Swaffham, "called Pendaunts". In the contract for the nave of Fotheringhay church, Northamptonshire, it is agreed that "the pillars and chapetrels that the arches and pendants shall rest upon, shal be altogedir of freestone wrought trewly and dewly as hit ought to be". Willson supposes this to refer to the timber arches of the roof, as "the springers of arches resting on shafts or corbels, are called pendents by ancient writers". Colling, *Gothick Ornaments*, 4to., Lond., 1850, ii, pl. 25 and 83, gives examples of both kinds. Viollet-le-Duc, *Dict.*, s. v. Claveau; and Construction. The term "pendant et knottes" occurs in an indenture for a tomb for Ralph Greene (*temp.* 6 Henry VI) at Luffwick, Northamptonshire; engraved in Halstead, *Genealogies*, 1685. 7. 22.

In Whewell, *German Churches*, 8vo., Lond., 1842, Lassaulx notices, p. 153, that the cloister of S. Stephen's at Mayence, "originating perhaps about the middle of the XVth cent., has elegant arches with pendent keystones; an uncommon circumstance hereabouts".

The pendant which hangs from the centre of the dome of the temple built by Tej Pâl or Tejpala at Dailwârâ, on Mount Aboo, is particularly remarkable. Col. Tod, *Travels in Western India*, 4to., Lond., 1839. Fergusson, *Pict. Illust. of Ancient Arch. in Hindostan*, fol., Lond., 1847, pl. ix, and *Handbook*, 1855, i, 69, illustrating the older temple, *cir.* 1032, writes of the Hindoo pendant, "its forms, too, generally have a lightness and elegance never even imagined in Gothic art; it hangs from the centre of a dome more like a lustre of crystal drops than a solid mass of marble or of stone". Forbes, *Râs Mâlâ*, 8vo., Lond., 1856, i, 269-70. Fergusson, *Indian, etc., Architecture*, 8vo., Lond., 1876, p. 238, gives a cut from a photograph.

PENDENTIVE (Fr. *pendentif*). A pendentive is formed from the intersection of a dome by a square or parallelogram. Pendentives in masonry are corbellings, by which the weight of the domed superstructure, erected upon a rectangular area, is chiefly sustained or transmitted through them to the angles of the substructure, some distance lower down, at the imposts. Or, they may be considered as the springers and haunches of diagonal arches contained in the dome, the thrust upon them acting in that direction towards the angles outwards; Building News *Journal*, 1876, xxx, 586. In Gothic masonry, the portion of a groined ceiling which is contained between and bounded by the longitudinal and transverse ribs, from the springing to their summits, is also a pendentive. 16. 25.

The *Eastern* or Byzantine *mode* of effecting this object was by forming it circularly, as a portion of a spherical cap cut out of the sphere, and of which the diameter is equal to the diagonal of the space which has to be covered; as at Sta. Sophia at Constantinople; S. Mark's at Venice; S. Antonio at Padua; Sta. Maria della Pieve at Arezzo; at Trento; etc. The *Western mode* was by forming a system of corbelling called a Squinch, thus forming the square into an octagon; and forming the base also for a dome. "Agathangelus, if I do not mistake, relates that 81 cupolas fell in the time of Constantine before the just proportions of pendentives had been found out", observes Dubois de Montperoux, *Voyage*, etc., 8vo., Paris, 1839-43, iii, 380, noticing the elliptical vaulted dome to the church of S. Hripsimé at Etchmiadzin.

The pendentive takes sometimes the form of a niche, fine examples of which exist at S. Michael at Pavia; S. Ambroise at Milan; the church at Monza; the cathedrals at Parma and Pisa; Nôtre Dame at Avignon; N. D. de Grâce at Arles, etc., and others as in the south of France.

The tomb of Mahomet at Beejapore is unique. The square form is altered into the circular form by a pendentive arch springing to the next but one springing, thus intersecting each other. At the mosques at Delhi and Agra, the pendentives (or squinches) were formed of small arches bracketing out one beyond the other. It was this form which was afterwards converted into the honeycomb work of the Arabs in Spain: Fergusson, *Illustrated Handbook*, p. 428.

The elemental forms of pendentives are shown in Isabelle, *Les Edifices Circulaires*, fol., Paris, 1855, pl. 25, and text. De Lassaulx, *Description of a mode of erecting light vaults over churches and similar spaces*, communicated to the Royal Institution of Great Britain, *Journal*, 8vo., Lond., 1831, i, 224-40. Viollet-le-Duc, *Dict.*, s. v. Coupole; Pendentif; Voûte.

In the British Museum are some light pendants, of earthenware elegantly painted, which were found in an Assyrian temple by Mr. Rassam.

The merits of a pointed pendentive dome are discussed in the Builder *Journal*, 1857, xv, 465.

PENETRALE, or penetralia. The most sacred part of a temple, which generally contained an altar to Jupiter Hercæus, which appellation, according to Festus, was derived from ερκος, an enclosure, and supposed him the protector of its sanctity. A so-called vault under the *cella* was discovered in the temple to Isis at Pompeii, wherein the priests concealed themselves, and gave forth the oracles, and pronounced sentences; it had secret stairs leading up to it; and was a temple more Egyptian than Greek; Starke, *Travels in Europe*, 8vo., Lond., 1833, p. 331. Another such recess, now filled with earth, was in the so-called temple to Jove at Ostia (p. 235). Others exist at Brescia; and in the temple of Venus and Rome, at Rome, where in the *socle* supporting the statue is the passage conducting to the retreat or penetrale, where only the priests had access; Batissier, *Hist. de l'Art Mont.*, 8vo., Paris, 1845, p. 269. Lararium. 1.

PENETRALE. A wimble or large augur. Surtees Society, *Finchale Priory*, 8vo., Newc., 1837, p. 440.

PENITENTIAL CELL and Penance chamber. A small building or enclosure in a monastic establishment, in which a penitent confined himself. A small chamber in which a member of a monastic order was confined for punishment. Only a few such places have been noticed; as in the crypt of Rochester cathedral; Ashpitel, in Archæological Association *Journal*, 8vo., 1854, ix, 282. At the Temple church, London, opening upon the stairs leading to the triforium is another instance, 4 feet 6 ins. by 2 ft. 6 ins., with two slits towards the church for light and air, and through which the prisoner, unable to lie down, could still hear mass. Here Walter de Bacheler, grand preceptor of Ireland, was starved to death for disobedience to the master of the Temple.

PENITENTIARY. In the early Christian churches, a portion at the west end was expressly set apart for penitents. A chamber is occasionally found there in ancient churches, as at Walpole S. Andrews, Norfolk, where it is 4 ft. 9 ins. square inside; at Lower Halling, Kent; at Boyton in Wiltshire; and at Burwell church, Cambridgeshire. They all show that the penitents remained in the porch until they could gain access to the confessor, who attended in the adjacent penitentiary. In larger churches, a long portico was capable of being parted off; and the side portions with rooms over the one designed for the especial purpose having the approach to the upper chamber within the penitent's porch; the other, probably intended for the use of the sacrist having its door opening into the aile; Builder *Journal*, 1846, iv, 521, and referring to Bedyll's recommendation that the said places should be "walled up and that use be fordoen for ever". Procopius, *De Ædif.*, i, 10.

PENITENTIARY. A place for the reception of criminals condemned to solitary confinement and hard labour, to reclaim them as much as possible. An Act of parliament passed 1776 contains the words "penitentiary houses". William Blackburn obtained in 1782 the premium offered by the

Commissioners for penitentiary houses, for the best plan for such establishments; thus many county gaols, etc., were built under his direction: he was succeeded by R. F. Brettingham in such works. Sir G. O. Paul, bart., designed 1791 the gaol at Gloucester, intended as a reformatory, which consisted of a penitentiary, bridewell, and sheriff's prison. In 1821, premiums of £200, £100, and £50 offered by government for the three best designs for an immense penitentiary prison for 600 transportable convicts, intended to be established at Millbank, on a system of reformation long since recommended by Mr. Howard, were awarded to — Williams, C. A. Busby, and — Hervey; ACKERMANN, *Repository of Arts, etc.*, 8vo., Lond., 1812, viii, 157. The last-named erected the building 1812-16; the gateway was by Thomas Hardwick, but this and other parts having failed, the whole was restored by Sir R. Smirke, R.A. A view of it is given in ACKERMANN, *Repository of Arts*, 8vo., Lond., 1817, iii, 153.

DEMETZ et BLOUET, *Rapports sur les pénitenciers des Etats Unis*, fol., Paris, 1837, with 48 plates, describes many of the American prisons, concluding with experiments on the construction of walls of cells in England by Crawford and Russell, and their design for cells. CRAWFORD, *Report on the Penitentiaries of the United States*, noticed in PENNY MAGAZINE, 1836, v, 71. The eastern penitentiary of the State of Pennsylvania 1822-37, by John Haviland, at Philadelphia, is described in CIVIL ENGINEER, ETC., *Journal*, 1842, v, 49. The propositions on the construction of prisons discussed at a meeting of delegates from the different European governments, at Bruxelles, Sept. 1847, to take into consideration penitentiary discipline, are printed in CIVIL ENGINEER, ETC., *Journal*, x, 334. BLOUET, *Projet de pénitencier cellulaire pour* 586 *detenus*, fol., Paris, 1843; reviewed in DALY, *Revue Générale*, 4to., Paris, 1843, iv, 134; 332: which, viii, 211, gives a general plan by — Bourla, for a "colonie agricole—pénitentiaire-industrielle, civile ou militaire pour 1260 colons". At Avignon, a pénitencier militaire, in the parc of the old succursalle des invalides, is given in DALY, xi, 1853, p. 89. A great penitentiary at Milan recently (1876) erected, cost 10 millions of francs, has 600 cells. There is also a large one at Perugia. CELL. PRISON.

PENITESI (GHERARDO), of Lucca, designed towards the end of XVI cent. the church of Sta. Maria (Doric and of white marble), which was destroyed when the piazza in that city was formed for the duchess Elise. 28.

PENNACHI (GIROLAMO); see PENACCHI (G.).

PENNANT. A term used in EVELYN, *Account of Architects*, etc., fol., Lond., 1706, p. 27, in describing semi-arches. In SERLIO, transl. by Peake, 1611, "the cunei or pennants of the arch" continually occurs, in lieu of the word "voussoirs". 16.

PENNANT STONE. A very hard, fine-grained sandstone, obtained from quarries at Stapleton; at Conham; and at Crew's hole, all near Bristol, affording paving stones, block stones for facings, slabs 10 to 15 ft. long, and rough stone for house building. The best quality is said to be obtained from Nailsea; it may be had there in blocks or slabs of very large size, limited only by the strength of the quarry cranes. It is chiefly of a deep blue colour; but there are beds of a deep indian red colour; the blue beds are the best; it is very durable, and it can be rubbed to a fine smooth surface, but it will not polish: it is much used for monuments in cemeteries. The stone will bear great weight, and is well suited for columns, and beds of steam engines. The Pennant stones vary in weight from 158 to 171 lbs.: BUILDER *Journal*, 1851, ix, 640, 685. HANHAM STONE.

PENNE, CIVITA DI (*Pinna* was the chief town of the Vestini). The chief town of a district in the province of Abruzzo Ultra in Southern Italy. The cathedral is dedicated to S. Maria degli Angeli and S. Massimo. GENTILI, *Dell' Acqua Ventina et Virium di città della Penna*, Naples, 1833. 28. 96.

PENNE S. MARTIN BRECCIA. A breccia still obtained from the quarry at S. Beat, Upper Garonne, in the Pyrenees; it was worked by the Romans. From it columns 40 to 50 ft. in length can be obtained. It is yellow, white, and grey, and very fine in quality; CLARAC, *Musée, etc., du Louvre*, 8vo., Paris, 1841, i.

PENNETHORNE (SIR JAMES), born June 1801 at Worcester, came 1820 to London, and entered the office of his uncle John Nash, under whom and A. Pugin he received his professional education. During 1824-26 he visited France and Italy, returning to the office of Nash. First employed in 1832 by the commissioners of Woods, Forests, etc., to devise plans for the improvement of the Metropolis, he carried out for them and for the commissioners for Metropolitan improvements, many new streets, etc., as New Oxford Street, Endell Street, New Coventry Street, and Commercial Street, Spitalfields, Buckingham gate at Pimlico, Kensington Palace Gardens, Windsor High Street, etc.; Victoria, Kennington, and Battersea Parks; the approaches to Chelsea new bridge; and the Chelsea embankment; and designed many other improvements, since carried out

Previous to 1840, when his entire services were required by the Government, he had designed and erected the bazaar in S James's Street, for William Crockford, esq. (now S. James's chambers); 1836-7, Christ Church, Albany Street (COMPANION TO THE ALMANACK, 1837, p. 219); 1837-38, Trinity Church, Gray's Inn Road, with catacombs for 1000 coffins; enlarged Lamorby house and chapel, for John Malcolm, esq.; Swithland hall, Leicestershire, for Butler Danvers, esq.; Dillington house, Ilminster, for John Lee Lee, esq.; St. Julien's near Sevenoaks, for the rt. honble. J. C. Herries; house at Newmarket, for William Crockford, esq.; and his design was one of the five selected for the rebuilding of the Royal Exchange.

Among his public works are 1837-48 the museum of economic geology, in Jermyn Street and Piccadilly; (BUILDER *Journal*, vi, 523, 559; CIVIL ENGINEER, ETC., *Journal*, x, 337; ILLUSTRATED LONDON NEWS *Journal*, xviii, 422, 446): 1847-50 the first portion of the general record repository, erected between Fetter and Chancery Lanes (B. *J.*, ix, 636; B. N. *J.*, 1856, p. 658): further portions were erected between 1863 and 1871. The new Stationery office, Westminster; 1848 the removal of the colonnade of the Quadrant, Regent Street; 1851 west wing to the Ordnance offices, Pall Mall, (B. *J.*, ix, 514); and 1852-56 the west wing to Somerset House, fronting Lancaster place, (B. *J.*, x, 193; B. N. *J.*, 1856, p. 584; I. L. N., xxiii, 493; and COMP. TO ALMANACK, 1853, p. 243). On this occasion seventy-five of the leading architects of the metropolis presented to him on May 13th, 1857, a gold medal in commemoration of his success. He further designed the new state Ball-room (B. *J.*, xiv, 298; xviii, 835), supper-room, and galleries in the south wing at Buckingham palace: the re-arrangement 1861 of the central portion of the interior of the National Gallery (B. *J.*, xix, 251); 1854-5, the offices for the council of the Duchy of Cornwall at Buckingham Gate (B. *J.*, xiii, 526); the rebuilding of the Stables at Claremont; new stabling and extensive alterations at Marlborough House; the library of the Patent office at Southampton Buildings; and many other works. His last and most successful design was 1866-70 the building for the University of London, Burlington gardens, (BUILDER *Journal*, plan and elevation, 1867, xxv, 855; list of statues, xxvii, 303; its opening, xxviii, 377.)

On the re-organisation of the Office of Works, etc., Mr. Pennethorne retired from public service; and in November 1870 had the honour of knighthood conferred upon him; he was a member of the Academy of S. Luke at Rome; and of the Society of Architecture at Amsterdam; and May 29, 1865, he received the Royal Gold Medal placed at the disposal of the Institute. He died suddenly Sept. 1, 1871, aged 70, and was buried at Highgate. Several sons survive him, not in the profession; and a brother John Pennethorne, is mentioned s. v. Optical effects.

CATES, *Biographical Notes*, in Royal Institute of British Architects, *Sessional Papers*, 1871-72; also Appendix to *Sessional*

Papers, 1856-57. BUILDER *Journal*, 1857, xv, 366; 1866, xxiv, 877, 898; and xxix, 717, Sept. 16, 1871; 1872, xxx, 22. ENGLISH CYCLOPÆDIA. "Pennethorne and Public Improvements", in MECHANIC'S MAGAZINE, Oct. 7 and 14, 1871. BUILDING NEWS *Journal*, xix; xxi, 175, 479; ARCHITECT *Journal*, 1871.

PENNONE (ROCCO), of Lombardy, was also a sculptor. MILIZIA appears to attribute to him the enlargement of the ducal palace, formerly the residence of the doge, at Genoa, in mistake for A. Vannone. He completed about 1624 with Lazzaro Tavarone the tribune and choir of S. Lorenzo Metropolitana, discarding the simple design left by G. Alessi, and covering the walls and dome with elaborate and rich marble ornamentation. He also decorated the chapel of the Annunciation by D. Casella, in the church of S. Siro: with other churches and palaces. He died in 1657: his son CARLO STEFANO died soon after. 3. 5. 37.

PENNY, or PINNEY, stone. A quarry lump, which has to undergo some or other of the following operations, as described s. v. scalping; broaching; then *hewn*, and rubbed.

PENRHYN or PENRYN GRANITE; see Granite (p 71, etc.). Penzance granite is stated to be supplied as Penryn and Lamorna.

PENRHYN or PENRYN SLATE; see SLATE.

PENROSE (.....), architect to the Board of Works in Ireland, to whom has been attributed the design of the parliament houses in Dublin, erected 1729-39; but it was probably by E. L. PEARCE, who is not mentioned in WRIGHT, *Ireland Illustrated*, 4to., Dubl., 1829-31, p. 29. Penrose, however, may have been engaged 1786 in the additions made to the then house of commons. He designed 1745-7 the Phœnix column, of the Corinthian order, 30 ft. high, placed in the Phœnix park, under the administration of the earl of Chesterfield; WRIGHT, p. 25. Penrose died shortly before July 1793. MULVANY, *Life of Gandon*, 8vo., Dubl., 1846, p. 116; 144.

PENSON (THOMAS), born in 1792, at Wrexham, was a pupil of H. Harrison of Chester. Settling at Oswestry, he eventually had an extensive local practice in the counties of Montgomery and Denbigh. He designed many churches and parsonage houses, etc., and designed and altered a considerable number of private residences, which are noticeable for their quality of comfort: among the best, are Vaynor park, for Mr. Lyon Winder, in the former county, which ranks equal to any other modern Elizabethan design; and Llanrhaiadr hall, co. Denbigh, for W. Price. He held for upwards of thirty years the appointment of county surveyor for the above-named counties, erected many county buildings and bridges; among the best of which are those at New bridge near Wynnstay, over the river Dee; and one at Llanymynent over the river Virniew. He has also the merit of completely revolutionising the roads in the main lines of the county of Montgomery. He was a member of the Institution of Civil Engineers; and a fellow of the Institute of British Architects from 1848. He died Oct. 1859, and was buried at Gwersyllt near Wrexham. His two sons T. M. and R. K. Penson practised in the profession; the former settled at Chester, and died 1864; a view of some new Gothic houses by him is given in BUILDING NEWS *Journal*, 1860, vi, 400.

PEN-STONE. A term used in the northern counties for an arch stone, going through the full thickness of the wall; as specified in LOUDON, *Encyc. of Cottage, etc., Arch.*, 8vo., Lond., 1833; p. 981; 987. PEND-STONE.

PENTACLE. A term misapplied to a figure formed by a double intersecting triangle both of the same size, but hence arise six points. Its form has been taken for one of the systems of proportion in early ornamental art; it was used by the astrologers and mystics of the middle ages, as a symbol of superstitious import. The head of the tracery in the west window at Exeter cathedral, 1327-69, is formed on a triangle, in the top of which is a large circle, its tracery being set out on this figure; CRESY, in GWILT, *Encyc.*, edit. 1876, p. 989, fig. 1285. A large pattern formed of tiles in four colours displaying this form, in Willington church, Bedfordshire, is given in ARCHITECT *Journal*, 1850, ii, 358. PENTALPHA.



PENTADORON. The Greek term for a brick five palms long. BRICK (History of; p. 137). PALM.

PENTAGON. A figure formed by connecting five points placed equidistant on the circuit of a circle; as dotted line in figure s. v. Pentalpha. Buildings have been designed on the plan of a pentagon, probably first suggested in fortifications. The palazzo at Caprarola, designed by A. San Gallo 1546, and

continued by Vignola, is an example. The celebrated citadel at Antwerp was built 1568 in this form by conte Pacciotto for the duke of Alva. Two similar shaped plans for temples are given in SERLIO, *Architettura*, fol., Ven., 1569, book v. A pentagonal church, end of XIV cent., at Kirchheim im Ries, has a convent's choir in the western choir. The summer palace of the dukes of Brittany at Sucinio; MACQUOID, *Through Brittany*, 8vo., 1877, p. 112. A pentagonal tower exists at the palace or castle of S. Michael at S. Petersburg, erected by Cavallari.

The height of the roof of S. George's church, Doncaster, was found to be the angle formed by two adjacent radii of a pentagon; DENISON, *Church Building*, 8vo., Lond., 1856, p. 189.

PENTAGONAL STAR; see PENTALPHA.

PENTAGRAPH; see PANTOGRAPH.

PENTALPHA. A figure, also called a "pentagonal star", composed of a five-fold A, formed by a continuous line. It is also described as composed of three interlacing triangles, the lines of the triangle forming it intersect each other in constant proportion. The form is found on buildings of all ages, and has been used to symbolise the Trinity, and eternity. It occurs on the coins of Mysia, as a sign of fertility, and on the coins of Tunis. BURROW, in *Asiatic Researches*, 4to., Calcutta, 1790, ii, 479, noticed the natives at Kessereah, in the Hadjipore district, playing with cowries on a diagram of this pattern. This form appears also under the name of pentagramma, *alpkreuz* or cross A, and *Druidenfuss*. It is said to have been used by the Pythagoreans as a countersign; by others as a symbol of the deity; against witches and demoniacal powers; and by the freemasons as a geometric figure of proportion; BUILDER *Journal*, 1848, vi, 351-2. The



round window in the north transept of the church of S. Ouen, at Rouen, is set out on this form with a point upwards; the round window in the north transept at Amiens cathedral has a point downwards; CRESY, in GWILT, *Encyc.*, edit. 1876, p. 994-5, and figures 1293 and 1294.

PENTASTYLE. A work wherein there are five rows of columns; or five columns arranged as to a façade. The portico to Roseneath, Dumbartonshire, designed 1803-6 by Joseph Bonomi, A.R.A., has five columns, and projects for carriages to drive and set down under it, hence he considered unnecessary the central space usually required to mark the access to the house. GWILT, *Encyc.*, edits. 1867, and 1876, p. 229.

PENTELIC MARBLE. A yellowish white, close grained, marble, having other striæ or greenish layers which cause it to peel off in the air. CIPPOLINO. It was obtained from a quarry at Mons Pentelicus, near Athens; and was used in the construction of the Parthenon, and for the columns of the temple of Jupiter Olympius, at Athens (MACULOSUM MARMOR); and for the roofing tiles of the temple of Jupiter at Olympia. WOODS, *Letters*, 4to., Lond., 1828, ii, 251, states that it was obtainable in slabs of considerable length and breadth, but that the thickness was more limited: he mentions courses of 20⅛ ins., and when a greater width was required, the stone was set on edge. The material is still used (1878), as for the new academy at Athens, designed by T. Hansen of Vienna, and E. Ziller. 6.

PENTHER (JOHANN FRIEDRICH), of Furstenwalde; professor at Gottingen; published *Praxis Geometriæ*, fol., Augs., 1732; 1761; 1776. *Anleitung zur bürgerlichen Baukunst, etc.*, 4 vols., fol., Augs., 1744-48; 1775-79-67-71. *Bau-Anschlag-nebst verschietenen Bau Anmerchungen*, fol., Augs., 1753. *Bau-Anschlag oder richtige Anwersung alle Bau-materialien*, fol., Augs., 1765; and *Lexicon Architectonicum*, 4 vols., fol., Augs., 1775. He died 1749, aged 56 years. 68.

PENT-HOUSE (Lat. *compluvium; appenticia;* Fr. *angar; auvent; abat-vent; appentis;* Sp. *tejadillo;* Ger. *kleinedeck*), from appenticium; also penteys, pentice, pentise, and pentese as in old manuscripts. APPENDARIA. APPENDIX. A lean-to roof. Regulations in the reign of king John are given in UNITED SOCIETIES, etc., *Proceedings*, 1852-53, p. 364; also at a much later period, in HOWELL, *Londinopolis*, fol., Lond., 1657, p. 393; and TURNER and PARKER, *Domestic Arch.*, 8vo., Lond., 1851, i, 239; and ii, 77, gives several instances, in XIII and XIV centuries, of the king's orders for the erection of pent-houses. ANTEVANNA; BULK; LEAN-TO; LEVEGEL; LODGE; CULATIUM. 4. 19.

PENTILE; see PANTILE.

PENTOMA (magister TANCREDUS DE), of Valva, made 1272 the public fountain called la Rivera, at Aquila. The inscription is given in MILIZIA. NAGLER gives the date as 1262. 3.

PEON or POON WOOD; see CALOPHYLLUM.

PEONIUS; see PÆONIUS.

PEPARELLI (Fra DOMENICO). To him is attributed the palazzo Bonelli, afterwards Imperiali, in the piazza di SS. Apostoli, at Rome, but which was more probably designed by D. Paganelli in 1585. He is mentioned in MILIZIA s. v. M. Lunghi as his adversary. MARCHESE, *Lives*, 8vo., Dublin, 1852, ii, 324. PASSERI, *Vite*, 4to., Rome, 1772, p. 233. 3.

PEPERELLI or PEPARELLI (FRANCESCO). A monk, made *cir.* 1583, at Rome, various designs for edifices, including the palazzo Niccolini near the church of Sta. Maria Transpontina; and the palazzo del Sig. Marchese del Bufalo, in the piazza Colonna, given in FERRERIO, *Palazzi*, fol., Rome (1655), pl. 90. He also designed the tomb of Laura Mattei in the church of S. Francesco a Riva. 68.

PEPERINO STONE (*piperno* and *piperigno*, from Ital. *pepe*, pepper), formerly called lapis Albanus. A volcanic sandstone or tufa, hard and rough, the surface covered with knobs of flint resembling peppercorns, hence the name. There are ancient quarries near the town of Albano; another near Alba Longa on Monte Cavo, and another at Marino, still in use. This and other tufas bear weights very well; and weigh at most only from 85 to 91 French lbs. per cubic foot. Squared blocks are easily obtained. It is grey, yellowish, red, fawn, or blackish in colour; at the Tarpeian Rock it is fawn coloured. It does not appear probable that it flowed in the manner of ordinary lavas, but everything leads to the belief that after having been soft and sandy, it has become consolidated by pressure, infiltrations, the oxidation of iron, etc. The stone generally employed at Naples is also a tufa called *peperino*, the greater part being brought from beyond Fontanelle; and a grey stone, light and sonorous, called *piperno*, is extracted from the craters of Soccavo and Pianura. According to BREISLAK, it appears to have flowed after the manner of lava, and by this very fact it differs from real tufas. BRARD, *Mineralogie*, 8vo., Paris, 1821, ii, 50. PARKER, *Archæology of Rome*, 8vo., Oxford, 1874, notices the use of Peperino at Rome; where the great common sewer, the foundations of the Capitol, the rostral column, the tomb of Scipio, and a tomb near Albano, are of this material. LAPIS GABINUS.

Peperino is used in the present day for door and window jambs, at Naples and Rome; and serves also for artists to work upon in oil. The piers in the nave of the church, begun 1279, of Sta. Maria Novella at Florence are of this material; MARCHESE, *Lives*, 8vo., Dublin, 1852, i, 23. 6.

PEPPERCORN RENT. Land generally taken at a peppercorn for such term as is sufficient for the erection of the buildings. "This, as one of the nominal items payable by a vassal to his superior, seems to have originated in the feudal ages. The word peppercorn simply denotes anything of inconsiderable value, which freeholders pay to their landlord to acknowledge that they hold all from him. This kind of service is called in Scotland 'blanch-holding', in which the vassal pays a small duty to the superior, in full of all services, as an acknowledgment of his right, either in money, or in some other article, as a penny, money, a pair of gilt spurs, a pound of wax, or of pepper, etc., nomine albe firmæ"; ERSKINE, *Institute of the Law of Scotland*, edit. 1773, i, 209; quoted in NOTES AND QUERIES *Journal*, 3rd Series, x, 91. In 5 Edward I, 1276-7, the aldermanrie—between Ludgate and Newgate—was granted for one clove (or slip) of gilliflowers at the feast of Easter, in consideration of twenty marks paid in the name of a gersum or fine. This flower was of great rarity. A red rose was paid 20 March, 18th Elizabeth, for the gate house and garden of Ely Place, Holborn, and liberty of the bishop of Ely, who granted the same, of gathering twenty bushels of roses yearly in the same.

PEPUL TREE, see FICUS religiosa. It is the Bo or Bodhi tree of India, where it is very destructive to the buildings: FERGUSSON, *Indian Architecture*, 8vo., Lond., 1875, p. 69; 189; 199; 656. BUILDER *Journal*, 1855, xiii, 13.

PERA; see CONSTANTINOPLE.

PERAC and PERACH (ESTIENNE DU); see DUPERAC (E.).

PERAMBULATION. The act of walking round or "beating the bounds" of an estate or parish by the inhabitants and authorities, derived from the ancient way of keeping up the record of their limits among the living. NORDEN, *Surveyor's Dialogue*, 8vo., Lond., 1607; 1610; 1618, and 1738, and partly reprinted in *Detached Essays*, 1848-52.

PÉRARD (.....), of Montreuil; see PERRARD (.....).

PERCENTAGE. The term applied to a payment made at so much per cent. on the amount, when the work is not charged for according to value or time. The various papers on the subject of "Professional Charges" are deposited at, and others have been issued by, the Royal Institute of British Architects, supplemented by those of other professional societies.

PERCENTAGE CONTRACT. A contract which provides for the payment to contractors of the actual cost of all labour and materials used in the work of cutting, dressing, and boxing the stone, increased by a percentage of the same. A system practised for the American government works, as explained by the supervising architect, in BUILDING NEWS *Journal*, 1875, xxix, 613. Fifteen was the percentage there named.

PERCEVAL (JOHN), second earl of Egmont (1748-72) is stated "to have planned and designed his seat", Enmore castle, near Bridgewater, Somersetshire, a castellated square mansion 157 ft. by 150 ft., with an interior court. WATTS, *Views of Seats*, fol., Lond., 1783, pl. 54.

PERCH, PEARCH and PERK; see PEARC. 17. 19.

PERCH, perk and perche (Lat. *pertica*; also *virga*). A measure of length for land, and also called ROD, log, lug, and lugge, used chiefly in calculating acreage. Its many variations in length has necessitated the introduction into deeds of the words "customary measure" of the place or county. The "Statutum de Admensuratione Terre", of uncertain date, but supposed 33 Edward I (1306), or 17 Edward II (1323-24), given in TOTTELL, *Magna Charta, etc.*, 1556, states that "five yards and a half make one perch, that is sixteen feet and a half, measured by the iron yard containing three feet and no more". In a short article intituled "Compositio Ulnarum et Perticarum", inserted in MS. Cott. Claudius, D. II, fol. 241*b*, etc.; and in RASTALL, *Collection*, 1603, "It is ordained that three grains of barley dry and round do make an inch; twelve inches make a foot; three feet make a yard; five yards and a half make a perch; and forty perches in length and four in breadth make an acre"; STATUTES OF THE REALM, fol., Lond., 1810, i, 206-7. The Statute 35 Elizabeth (1592-93) respecting "Building in London" declares 1 mile = 8 furlongs of 40 perches of 16 ft. 6 ins. each. Previously thereto it had been 7½ furlongs 3 perches and 2 palms; PENNY CYCLOPÆDIA, s. v. League, and Perch. The English statute perch = 16 ft. 6 ins. In Wiltshire to 12 ft. 4½ ins.; Devonshire, Somersetshire, and Derbyshire, 15 ft.; Dorsetshire (Isle of Purbeck), 15 ft. 1 in.; Herefordshire, 16 ft. 6 ins.; Cornwall and Ruislip, 18 ft.; Lancashire, 21 ft.; Staffordshire and Cheshire, 24 ft.; Gloucestershire (in 1541-2), 18½ ft. and 3 ins.

Some Church measure of land = 21 ft. In some manors, called "tenant right" and "curt measure" = 12 ft.; WORSOP, *Sundry Errors*, 4to., 1582, fol. B 2. In Woodland measure, 18 ft.; Forest measure, 16 ft. and 24 ft.; Arable, meadow, or pasture, 16 ft. 6 ins.; Forest of Sherwood, 25 ft.; and 21 ft., the foot there being equal to 18 ins., the measure whereof is marked in the chancel wall of Edwynstow, and in the church of S. Mary in Nottingham; CHAMBERS, *Cyclopædia*, s. v. Perch; Ex. Regist. Abb. de Novo Loco in Com. Nott. Cunningham or Scotch measure = 18 ft. 9 ins.; Scotch fall, generally, 18 ft. = 18·5299 Eng. ft., in some places 19 ft. 6 ins.

In France, the perch varied from 18 to 27 French feet. The royal perch = 22 Fr. ft. = 23·4515 Engl. ft.; mean perch = 20 Fr. ft. = 21·3195 Engl. ft.; lesser perch used at Paris = 18 Fr. ft. = 19·1 876 Engl. ft.; OZANAM, *Math. Recreations*, transl. by Riddle, 8vo., Lond., 1840, p. 191. The perch of Normandy = 24 ft.; and is said to have "varied every year, according to the size of the man's foot which the farmers chose to make the standard of the season"; ST. JOHN, *Residence in Normandy*, in CONSTABLE'S MISCELLANY, 12mo., 1826, vol. lxv.

In Ireland, *temp.* king John, the perch was 20 ft., afterwards reduced to 16½ ft. In most counties in Ireland the perch is 21 ft., or Irish plantation measure; and 16½ ft., or English statute measure. Other lengths are noticed in WARE, *Antiq. of Ireland*, fol., Dubl., 1764, ii, 224.

CASTLE, *Elementary Text Book*, 8vo., Lond., 1846; CIVIL ENGINEER, ETC., *Journal*, ix, 357; NOTES AND QUERIES *Journal*, 3rd Ser., ii, 213; 296; HUDSON, *Land Valuer's best assistant*, 8vo., Lond., 1859; 1874.

PERCH, as a quantity of work done or to be done. Hugo de Baius, granted to Robt. Rabacius, half a knight's fee for building one perch (unam percam) of the wall of the castle of Willeburne, *temp.* Rich. I (1189-99); British Museum, Add. Chart., select. 6038, with seal attached; it is 7½ ins. by 6 ins. high, and in large writing. In Herefordshire, a perch of fencing is 7 yards or 21 ft.; of walling, 16 ft. 6 ins.; and of ditching, 20 ft. NOTES AND QUERIES *Journal*, 5th Ser., x, 284.

Buildings in England during the mediæval period were set out with the English perch of 16 ft. 6 ins.; while in those of France, the French perch royal of 22 pieds du roi, was employed: the few exceptions at Bayeux, Caen, S. George Bocherville, and some others with round arches, and the church of S. Ouen at Rouen, in the flamboyant style, are set out with the English perch of 16 ft. 6 ins., and are universally attributed to English constructors; CRESY, *Principles of Proportion*, in *Encyc. of Civil Engineering*, 1847; and in GWILT, *Encyc. of Architecture*, edit. 1876, p. 1015.

A perch of walling; what shall constitute this quantity is usually stated in Specifications. A standard perch being taken as 21 ft. (or 16½ ft.) long, 18 ins. high, and 12 ins. thick. This is about "a yard of stone," or a ton, or horse-load. The dimension of 21 ft. by 1 ft. by 18 ins. thick, is given in NOBLE, *Prof. Practice*, 8vo., Lond., 1836, p. 148, as equal to 24 ft. 9 ins. cube; with other remarks on it. In South Wales it varies from 18 ft. to 36 ft. cube.

In Ireland, the standard perch = 21 ft. by 18 ins. by 12 ins., equal to 31½ ft. cube; and the ordinary perch = 16½ ft. by 18 ins. by 12 ins., equal to 24¾ ft. cube.

For Brickwork: The perch now adopted throughout Ireland is 21 ft. long by 1 ft. high by 9 ins. thick; openings included as solid work = 15¾ cube feet: a 4 in. wall reckoned as two-thirds a nine inch; and a 3 in. wall is half a 9 in. wall; (1861). NICHOLSON, *Dict.*, 4to., 1835, i, 105. GRANDY, *Timber Importers', etc., and Builders' Guide*, 8vo., Lond., 1865, p. 133; 135; 141. The perch is stated as 21 ft. by 1 ft. high and 18 ins. thick: BUILDER *Journal*, 1861, xix, 113; or the brickwork is measured by the cube yard or superficial yard, reduced to 9 ins. thick. In Bristol and part of Wales it is 16 ft. 6 ins. by 1 ft. by 9 ins. thick, making 12 ft. 4½ ins. cube; NOBLE, p. 149.

PERCIER (CHARLES), born Aug. 22, 1764, as on a medal struck by his pupils (not Sept. 5 as usually stated), at Paris, entered when very young the atelier of the painter Lagrenée; and 1783 became a pupil of Peyre the younger, and of Gisors. He gained 1783 the second *grand prix*, and 1786 the first *grand prix*, by which event he was sent to Rome, where he met and became the intimate friend of Fontaine, returning to France in 1792. There he made designs for decorators, changing taste into the *style l'Empire*. He joined Fontaine about 1795 or 1798. A list of their joint designs and publications is given s. v. FONTAINE, though Percier's name appears first on the title pages. To these may be added 12 plates in the *Musée des Monumens Français*; the monument to general Desaix, which obtained 1801 the first prize in the public competition, was erected 1803 in the *place* Thionville at Paris, the sculpture by Fortin (ALLAIS, etc., *Projets d'Arch., Grands Prix*, fol., 1806, pl. 107); designed about forty tombs; and 1824 the mausoleum in the church Sta. Croce at Florence, erected to countess d'Albany, widow of Charles Stuart, the pretender. He was elected 1811 membre de l'académie des Beaux Arts of the Institut de France; and to other honours. He died Sept. 5 (not Oct. 8, or Dec. 5, as in some books), 1838, aged 74 years. He had taken pupils in 1795; besides those noticed s. v. Fontaine, were A. J. Frary; A. Leclère; P. Abadir; L. N. M. Destouches; F. von Gaertner; M. P. Gauthier; A. Grandjean de Montigny; C. F. Maillet de Boullay; J. Latapie; L. H. Lebas; P. M. Letarouilly; C. F. Nepveu; L. P. Haudebourt; A. Famin; — Bouché; — Bourla; J. N. Chevron; — de Greef; F. J. A. Dukers; — Louyet; — Renard; — Reyers; L. Roelandt; and T. F. Suys. His pupils struck a medal in his honour. 14. 110.

Discours prononcé sur la tombe, par C. Rohault de Fleury et M. A. Lebas, 4to., Paris, 1838. VAUDOYER, *Nécrologie de M. Percier*, MS. 1838, with a lithograph portrait; translated by T. L. DONALDSON, and read at Roy. Inst. of Brit. Architects, 4 Feb. 1839. VAUDOYER, *Mémoire hist. sur la restauration de la colonne Trajane, faite par C. P. en* 1788, MS. fol., 1840. RAOUL-ROCHETTE, *Notice sur la vie et les ouvrages*, 4to., Paris, 1840. DALY, *Revue Générale*, 4to., Paris, 1841, ii, gives *Percier, sa vie*

et ses ouvrages, by G. Eysenbach; which was translated in the Allgemeine Bauzeitung, 4to., Vienna, 1841, p. 148. Baltard, *L'école de Percier*, 4to., Paris, 1873. Dussieux, *Les Artistes Français*, 8vo., Paris, 1856, contains notices, p. cviii, 238 and 391. Woods, *Letters*, 4to., Lond., 1828, p. 27. Clarac, *Descr. du Louvre, etc.*, 8vo., Paris, 1853, p. 398.

PERCLOSE; see Parclose.

PERCUSSION. The collision of bodies in motion. Impact. Gregory, *Mathematics for Practical Men*, 8vo., Lond., 4th edit., 1862, p. 239, gives rules, under certain conditions of the bodies, whether hard, soft, or elastic. It has been ascertained that an iron bar has been hollowed by percussion with a hammer of small dimensions in comparison with the mass of material; Henry, at American Association of Science, 1855; printed in Civil Engineer, etc., *Journal*, xviii, 378. Rankine, *Applied Mechanics*, 4to., Edinb., 1868. Routh, *Dynamics of a system of rigid bodies*, 3rd edit., 8vo., Lond., 1877. *Stability of a given state of motion, particularly steady motion*, 8vo., Lond., 1877.

PÈRE (J. B. le); see Lepère (J. B.).

PEREGO (G.....), designed 1812 the palazzo Saporiti, formerly Belconi, later Bocca, at Milan; it was carried out by J. Giusti: Cassina, *Le Fabbriche di Milano*, fol., Milan, 1840-44.

PERELLE (Gabriel, ?1603-77; Nicolas, ?1631--..... at Orleans; and Adam, 1640-95 March 23, not 26 as in Felibien), engraved about 1660-95 upwards of 500 plates of *Les places, portes, fontaines, églises et maisons de Paris; Vues des belles maisons de France*, and many others, as given in Universal Catalogue of Works on Art, 8vo., 1870. Jal, *Dict. Critique*, 8vo., Paris, 1867.

PERETTO WORK. A term used in Plaw, *Ferme Ornée*, 4to., Lond., 1795, p. 8, for a sort of rough cast. Paretta work.

PEREZ (Juan Bautista). A native of Cascanta, in Navarre. At Valencia, he 1682 decorated the chancel of the cathedral; designed and built the steeple and the chapter house of the monastery of the padre Augustiniani; designed the church and college of S. Pio V of the Franciscans at Chelva in Arragon, which were built by his son J. Perez Castiel and his nephew don Josef Minguez; and executed the fountain in the plaza de S. Juan del Mercado. He executed several difficult reparations at Florence, at the parish church at Rusafa, and at the church of S. Bartolomé at Valencia. 66.

His son Mosen Juan Perez, with don J. Minguez, built the tower of the church of S. Lorenzo at Rusafa; and of that at Chelva, completed 1677-1702 by J. Perez Castiel. 66.

PEREZ (Marcos), *aparejador*, a native of Galaroza, was 1587 and later, *maestro mayor* of the hospital of La Sangre at Seville, being preceded by M. de Gainza, H. Ruiz, and A. de Maeda. He fell whilst on the works at the church of Aracena, and died 13 August 1597. 66.

PEREZ (Macia), repaired 1271 one of the two Roman bridges near Merida in Spain. His name occurs as late as 1310 in the collection of Papal Bulls printed at Santiago, p. 213. 66.

PEREZ (don Silvestro), born 1767 at Epila near Saragossa; studied with the painter don Emanuel Eraso, and the architect don Antonio Sanz, and 1781 under Ventura Rodriguez at Madrid. He was sent to Rome in 1791 by the academy of S. Fernando to study; recalled in 1796, and appointed professor of practical geometry and perspective, and 1805 deputy director. He designed works at S. Sebastian, Bilbao, Bermeo, Motrico, Durango, the theatre at Vittoria, up to 1821 when he returned to Madrid. He visited Paris, returned 1824 to Madrid; surveyed the sacristy in the cathedral at Seville, removing the immense timber reredos; and he designed also for that city a stone bridge over the river Guadalquiver in place of the bridge of boats, putting his instructions in writing; as he did also for forming the grand square, the plaza de la Encarnacion. He died at Madrid 17 Feb. 1825, aged 57 years. Llaguno gives his epitaph. 66. 68.

PEREZ (el maestro Pedro), designed the cathedral at Toledo, the first stone of which was laid 1264; the dates 1226, and 14 Aug. 1227 are also stated. A tablet now in the doctor's chapel or sacristy of the chapel of S. Catherine gives the date of the death of Perez as 10 Nov. 1328, but it is also said he died in 1290. 3. 66.

PEREZ (Ximon), submitted 1522 competition designs for the sacristies in the cathedral at Seville. Jimon. 66. 116.

PEREZ de Andrade (Fernan), finished the bridge over the river Tambre, near Sigueiro, not far from Santiago in Galicia; the date is mutilated. 66.

PERFORATED GLASS; see Lockhead.

PERFORATED WORK; see Lattice: Fret cutting.

PERGA or Perge. One of the most celebrated towns of Pamphylia, in Asia Minor, situated on the river Cestrus, encircled by strong walls flanked by towers. On the hill behind it was the celebrated Ionic temple of Diana, now destroyed, which was represented on several of the imperial coins of the city. The proscenium and seats, almost perfect, of a theatre about 330 ft. wide, accommodating 12,000 persons easily: the stadium; and colonnades bordering the streets in the middle of which were marble channels for water, are described in Texier and Pullan, *Byzantine Arch.*, fol., Lond., 1864, p. 31; pl. 3. The ruins of a palace of vast extent are also mentioned in Fellows, *Journal*, 8vo., Lond., 1839, p. 190. 28. 50.

PERGAMO and Ringhiera. Italian terms used by English writers for a pulpit.

PERGAMOS (modern Bergma, Bergama, and Bergamo). A strongly fortified city of Mysia, in Asia Minor, situated north of the river Caicus (Aksou or Bakir). Lysimachus, 360-281 B.C. here deposited his treasures. It was the capital of the Roman province of Asia; its most celebrated building was a temple of Æsculapius, remains of which are still to be seen. Texier, *Asie Mineure*, fol., Paris, 1839-49, ii, gives 12 plates of the basilica, amphitheatre, two bridges, and a cratère vase of marble. Texier and Pullan, *Asia Minor*, fol., Lond., 1865, pl. 59 and 60, gives the basilica, 137 ft. 9 in. by 70 ft. 2 in. inside, with two detached circular edifices near it, and called the church of S. John. Leake, *Journal—in Asia Minor*, 8vo., Lond., 1824, p. 266. Arundel, *Seven Churches*, 8vo., Lond., 1828, p. 275; and *Asia Minor*, 8vo., Lond., 1834, ii, 302. Dallaway, *Constantinople*, 4to., Lond., 1797, p. 292-99. Macfarlane, *Const.*, 4to., Lond., 1829, p. 141. Fellows, *Excursion in Asia Minor*, 12mo., 2nd edit., Lond., 1852, p. 34. *Photographs* have been taken of a Christian Church, now a mosque; the Roman basilica; the West gate; and a view from it. A plan and section of baths, measured by T. L. Donaldson, are given in *Detached Essays*, Baths, etc., pl. 3. 14. 28.

PERGENYNG; see Pargetting. 17.

PERGET and Pergen. Old ways of writing Parget.

PERGOLA and Pergolaria. The Italian terms for a shady place formed by piers supporting poles and planks lengthways and across, over which vines and other creeping plants are trailed. Wyatt, *Mosaics*, fol., Lond., 1848, p. 10, notices the representation of a vine to the vaulting of the baptistery erected by Constantine, dedicated to Sta. Costanza, at Rome. Pergolas are seen in many Italian views, as in Hittorff and Zanth, *Arch. Moderne de la Sicile*, fol., Paris, 1835, pl. 33; in Leclerc, *Recueil d'Arch.*, fol., Paris, 1826, pl. 10, 11, 20, and 34. 1. 2. 6.

PERGOLO. An Italian term in use by English writers on Art for a balcony.

PERGULA of a Roman House; (Ital. Pergolo). A gallery; a sort of balcony.

PERIBOLUS. The Greek term for an enclosing fence or wall, hence it has become extended to a court, or enclosure within it; and is applied principally to the precincts of a temple or a tomb. Temenos. Such an enclosed space sometimes had a colonnade on each side, and was frequently ornamented with

statues, altars, and monuments, and sometimes contained other smaller temples or a sacred grove. It is supposed that the mausoleum of Halicarnassus stood in a peribolus, which is conjectured to have been about 411 ft. by 259 ft., by FALKENER, *Classical Antiq.*, 8vo., Lond., 1851-2, i, 176, who notices instances of such enclosures. The finest existing example is perhaps that at Palmyra; others are noticed by INWOOD, *Erechtheion*, fol., Lond., 1827. SALMASIUS, *Hist. Aug.*, in Spartian., 8vo., Lug. Bat., 1671, p. 677. HIERUM. 25. 78.

PERICLES. The celebrated Athenian statesman, who entered on public life about 469 B.C., and died 429. Under his leadership the arts in Greece attained perfection. He adorned Athens with the temple of Minerva or the Parthenon; the Odeion; and the Propylæa; and constructed the Piræus or port of Athens, with its edifices and the long walls. He employed Phidias the sculptor; and a group of the greatest sculptors and architects; among the latter were;—Ictinus, Hippodamus of Miletus, Callicrates, and Menisicles or Mnesicles. THUCYDIDES. PLUTARCH, *Pericles*. DALBERG, *Péricles, ou de l'influence des beaux arts sur la félicité publique*, 4to., Parma, 1811. (CRAUFURD), *On Pericles, and the Arts in Greece previously to and during the time he flourished*, 8vo., Lond., 1815. THIRLWALL, *History of Greece*, 8vo., Lond., 1845-52. GROTE, *Hist. of Greece*, 8vo., Lond., 1862; iv, 161, etc. W. W. LLOYD, *The Age of Pericles, a History of the Politics and Arts of Greece, etc.*, 2 vols., 8vo., Lond., 1875; reviewed in ARCHITECT *Journal*, 1876, xiv, 170; 182; 196. DALY, *Revue Générale*, 4to., Paris, 1858, xvi, p. 97. 1. 3. 14.

PERICOLI (NICCOLO DE'), also, and more commonly, called il Tribolo; see BRACCINI (N.).

PERIDROMIDAS. The Greek term used in the passage, "Hypæthræ ambulationes (passages open to the air) quas Græci περιδρόμιδας, nostri xystos appellant", in VITRUVIUS, *l. c.*

PERIDROMOS. The Greek term for the space or walk between the columns of a temple and the walls enclosing the cell. PERIPTERAL. 1. 25.

PERIER (JEAN), or DE PÉRIERS (Johannes de Piris of the register), mason, took oath 12th Oct. 1362, before the chapter of the cathedral of Rouen as appariteur, or maître de l'œuvre de maçonnerie. He executed 1367 the mausoleum therein, intended to receive the heart of Charles V; Hennequin, *imagier* of Liège, executed the statue. In 1370 Perier worked on the grand portail, at the rose window, which was replaced early in the XVI cent. He held the above office for 26 years, died in 1388, and was succeeded by Jean de Bayeux. DEVILLE, *Revue des Arch.*, etc., 8vo., Rouen, 1848, p. 20-3.

PÉRIGUEUX (Vesunna, the capital of the Petrocorii, before the Roman period). The capital of the department of Dordogne, in the ancient province of Le Périgord, in the south of France; situated on the river Isle, over which is a fine bridge. An ancient tower is still designated Visone (from Vesunna), and the suburb in which it stands is called La Cité. The tower, supposed to have been a sepulchre or mausoleum, is about 200 ft. in circumference, and 64 (or 100) ft. high. Some ruins of an amphitheatre exist; DE CAUMONT, *Cours d'Antiq.*, 8vo., Paris, 1838, iii, 199; 459; 377; gives the size as 120 ft. by 119 ft.: as well as of aqueducts, etc., and of a Roman gateway; near the town are the remains of a Roman camp. The château de la Barrière, a ruin of the XVI cent., was built on Roman foundations with ancient materials. The tour du Puy-Saint-Front is given in VIOLLET-LE-DUC, *Dict. Rais.*, i, 414.

The ancient abbey church of S. Front, now the cathedral, is ascribed by DE VERNEILH, *Arch. Byzantine en France*, 4to., Paris, 1851, as the oldest, the largest, and the most curious of a series of forty monuments, all bearing in different degrees the impress of the same style, and all of the same family, the Gallo-Byzantine. It is remarkable for its plan of a Greek cross, and its five cupolas, each 30 ft. diam. VIOLLET-LE-DUC, *Dict. Rais.*, i, 170, states that the plan, form, and almost the dimensions of the basilica of S. Marco at Venice, are reproduced in S. Front; and another writer mentions that the same number of feet are used, but not of the same size; A. BERTY, while acceding to the Eastern origin of the buildings, says the mouldings and ornamentation are excessively Roman of the same epoch. GAILHABAUD and others deny the resemblance, and doubt the dates usually given for the two buildings. This church of S. Front is considered to have been commenced 984-990, and consecrated 21 March 1047; (S. Marco stated as 977, and not completed 1071). Above the piers are Pointed arches, and above those the domes. An eastern chapel was added (*cir.* 1347), probably in the place of the original apse. At the west end are the remains of a Latin church of V or VI cent., consisting of a narthex and two bays of a nave and ailes, on which last the present tower, 197 ft. high, was raised early in XI cent.; it is considered the most ancient one in France. The church was "thoroughly restored" 1854-60 by Paul Abadie. A fragment of a tomb of 1169, giving an inscription of the founder and the date in a mêlée of capitals and oncials, is given in WILLEMIN, *Mon. Ined.*, fol., Paris, 1806-39, pl. 53. Guinamand, a monk, worked 1077-82 on the tombeau de S. Front. *Mémoire* in COMITÉ DES ARTS ET MONS., *Bulletin Mons.*, 1840, No. 4, p. 152, etc. Mémoire de l'Académie des Belles Lettres, xxiii, pl. at p. 20. GAILHABAUD, *Mons. Anciens et Mod.*, 4to., Paris, 1850, ii, pl. 42-5. VIOLLET-LE-DUC, *Dict. Raison.*, s. v. Cathédrale, p. 366; 369, etc. UNIVERS PITTORESQUE, France, pl. 193-194. DE CAUMONT, *Atlas du Cours d'Antiq. Mont.*, 1830, pt. 5, pl. 52, No. 2. GWILT, *Encyclopædia*, edit. 1867; and 1876. RAMÉE, *Hist. de l'Arch.*, 12mo., Paris, 1843, ii, 217. DONALDSON, *Remarks on a certain class of Gallo-Byzantine Churches*, read at Roy. Inst. of British Architects, Jan. 10 and 24, 1853. SHARPE, *On the early history of the Pointed Arch*, read at the Winchester Meeting of the Archæological Institute in 1847 or 1848. AUDIERNE, *Notice sur S. Front*, 8vo., Perig., 1839. DE VERNEILLE, *Notice sur S. Front*, in COMITÉ DES ARTS, ETC., *Bulletins*, No. 4, 8vo., Paris, 1840. RAMÉE, *Manuel de l'hist. gen. de l'arch.*, 18mo., Paris, 1843. PETIT, *Architectural Studies in France*, 8vo., Lond., 1854, gives illustrations of S. Front, p. 9, 66; La Cité, p. 63, 72; and Roman tower, p. 163. FERGUSSON, *History of Arch.*, 1867, i, 418; 460; ii, 240; 264. S. Etienne or église de la cité was the ancient cathedral down to 1669: it is a domical church, with a west bay of the same period as S. Front; the east bay, destroyed 1577 with the remainder of the nave, was carefully rebuilt 1615. The church of S. George dates 1860. 1. 14. 28. 96.

The préfecture dates about 1860; as also a new prison; the new town; the pont des Barris; a quay along the river Isle; and other works. Some buildings and vaults of the XII and XIII cents. are in rue de Limogeanne. A house in the rue Aiguillerie dates 1518; and another at the end of rue de la Sagesse, has Italian ornament. There are statues of marshal Bugeaud by Dumon; of Montaigne, and of Fénélon. DE ROUMEJOUX, *Périgueux in* 1868, in DE CAUMONT, *Bull. Mont.*, 8vo., Caen, 1868, 4 Ser., iv, 547. DUPUY, *Etat de l'église*, etc., 2 vols., 12mo., 1718. LEBEUF, *Dissert. sur les Antiq.*, in HIST. DE L'ACADÉMIE DES BELLES LETTRES, vol. xxiii. WILGRIN DE TAILLEFER, *Antiq. de Vésone*, 4to., Perig., 1821-26.

PERINI (LUDOVICO), son of Domenico, was born 1685 at Verona. He designed many churches, monasteries, and palazzi, under the direction of Benedetto Ciurani of Venice, a disciple of San Michele; as the church at Afi; and at Verona, the chapel of the Doric order in the cloisters of the ruins of S. Daniel; also the large seminario; the church of the Theresian nuns; that of the Colomba; the Jesuit college; with other edifices. The design for a new theatre was sketched by F. Bibiena, and completed under — Perini, the date of whose death after 1718 has not been ascertained. He published *Istoria delle monache di S. Silvestro di Verona*, 4to., Padua, 1720; and *Trattato della Pratica di Geometria*, 4to., Ver., 1727; 1750; Venice, 1757, 4th edit. POZZO, *Vite*, 4to., Ver., 1718; App. 29. MAFFEI, *Verona Illustrata*, fol., Ver., 1731, pt. ii, 297. 68.

PERIPATUS. A spacious area, full of various apartments chiefly used for cooking, as mentioned in DIODORUS, i, 47, etc., describing the Memnonium.

PERIPTERAL. One of the two species of circular temples. *Ædes*. It has a cell with detached columns around it, as at the temples of Vesta at Tivoli, and at Rome, both of which had originally twenty columns. Directions for its proportions are given in VITRUVIUS, iv, chap. 7.



MONOPTERAL. 1.

It is also a species of rectangular temple having 6 columns in the front and rear, and 11 on the flanks, counting the two columns at the angles; and these eleven are so placed that their distance from the wall is equal to an intercolumniation, and thus is formed a walk, called PERISTYLE, around the cell of the temple; as in that to Jupiter Stator; and in the portico of the theatre of Metellus; an example without a *posticum* is the temple to Honour and Virtue designed by Mutius, near the trophy of Marius, at Rome; VITRUVIUS, b. 3, chap. 1, transl. by GWILT, 8vo., 1826, gives a plate. The above rules, however, as to the number of columns in front and in flank, were not attended to in practice by the Greeks; SMITH, *Dict. of Antiq.*, s. v. Templum, p. 1107. When the cell was required to be large, the walls were built so as to fill up the intercolumniations, as at the maison carrée at Nismes, and Fortuna Virilis at Rome. 25.

PERISTALITH. A series of upright stones placed in a circle, sometimes covered by others placed horizontally, so as to form a sort of ceiling. CROMLECH contains further notice. A newly-found example occurs in the "grand island" near the bay of Lannion, in Brittany, as partly represented in BUILDING NEWS *Journal*, May 1878, p. 507.

PERISTELE (Gr. περι and στήλη, *stele*). A hall lighted through a wall having piers between the openings, in opposition to "peristyle" for a colonnade so used, as in FERGUSSON, *Mausoleum*, 4to., Lond., 1862, p. 34.

PERISTERIUM; see LOCUS COLUMBÆ.

PERISTYLE (Gr. περιστύλιον). A range of columns in one or more rows; VITRUVIUS, b. 5, ch. 11; and is thus often used to the range of columns around temples. The term is also applied to the platform round an edifice between the columns and the wall: PERIBOLUS. In Greek and Roman houses, the term was also applied to a court open to the sky, and having a colonnade around it. If the colonnades were on three sides only, the court would be improperly so called: PORTICUS. The woodcut of the plan of the temple at APOLLINOPOLIS MAGNA or Edfoo, in Egypt, shows such a court marked with the letter C. When the range of columns on the south side was higher than the rest, it was termed a Rhodian peristyle; VITRUVIUS, b. 6, ch. 10: an arrangement recommended by Xenophon, for the purpose of obtaining as much sun in winter, and as much shade and air in summer, as possible. The peristylium was transversely one third part longer than across; the columns were to be as high as the width of the colonnade; and the intercolumniations not to be less than three, nor more than four diameters of the columns. When the Doric order is used, the intercolumniation is arranged according to the triglyphs: VIT., b. 6, ch. 4. Where there were two courts, the outer one was termed the ATRIUM, and the inner one the peristylium, which was chiefly reserved for the women: VITRUVIUS, 6, ch. 8. The suburban villa of Diomedes at Pompeii has this arrangement; which with others are explained in SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Pompeii*, 8vo., Lond., 1835, ii, 11, 198, 104, 224. 25.

The name has been given to the arcades of the basilica at Vicenza, by Palladio, but not correctly. Also to the circular colonnades in front of S. Peter's at Rome.

PERITHYRIDES. The same as ANCONES. 1.

PERK. A term used in the wills of certain deceased persons in Norfolk, for a rood screen; PERCH. PEARCH.

PERKENTEN FLOOR. This term is used in the passage, "The oak perkenten floors in the hall story (of Lord Tyrone's house, Dublin, designed by R. Cassels, *cir.* 1740) are curious, being laid out in diamonds from 18 to 20 ins. square": CASH, *Views in Dublin*, 4to., Dubl., 1780, p. 118: it may probably be an error for "parquetry".

PERKINS' HOT WATER APPARATUS. This, the "high temperature" apparatus, was patented 30 July 1831, by Angier March Perkins, as described in REPERTORY OF PATENT INVENTIONS, 8vo., 1832, xiii, 129. An extension of the patent was granted 10 March 1845. Water is heated in a coil of pipes of an inch external, and half an inch internal, diameter, closed so as to prevent all communication with the external atmosphere, by which the temperature of the water can easily be raised to a heat of 400 degrees or more, yet if required, it may be maintained much lower. The high temperature thus raised is as influential in burning the air coming in contact with the pipes, as the heated surfaces of high temperature stoves. This objection militates much against the general introduction of the system. A way of obviating the difficulty is by covering the coil of pipes with external plates, by which any required degree of reduced temperature may be obtained. As the expansive force of water, when heated, is very great, due care is taken, in fitting up the pipes, to allow space for free expansion. This is obtained by having an "expansion tube", fixed at the highest portion of the pipes, one-tenth of the space of piping may be allowed for expansion. To prevent the temperature in any case from exceeding 325°, a heat sufficient for warming purposes, the expansion tube has been provided with a safety-valve. But when the expansion exceeds the pressure of the valve, the water is driven out, the coil is destroyed, red hot vapour is formed, and danger arises: the true remedy is the proper proportioning of the coil or boiler to the radiating surface.

In this form of apparatus, the great novelty in the adaptation of the heating power is the absence of a boiler; this is supplied by a coil of the small tubing placed in such a way that the surface of at least one-sixth of the whole piping is subjected to the heat of a furnace. The tube from the furnace is led direct to the expansion tube, which is placed at the highest part of the building where the heat is required; and from this any number of columns may be led to the various apartments to be warmed; uniting, and entering the coil at the furnace. A and B, show ranges of apartments, to be warmed; *a* is the coil of pipes in the furnace; *b*, the ascending pipe to the expansion tube *c*; *e e*, the descending pipe coiled in a mass *d d*, placed on the floor of the rooms, the tube continuing on to enter the bottom of the coil *a*. Wherever the coils are placed to give out heat, to insure a speedy current, a good supply of air should be provided. HEAT, *Detached Essay*, p. 18. *On the Comparative Merits of the various Systems of Warming Buildings by means of Hot Water*, Dublin, 1837, p. 11-13. A. M. PERKINS, *Improved Patent Apparatus, etc.*, 12mo., Lond., 1840. DAVIES and RYDER, *Report on Perkins's system of warming buildings by Hot Water*, 8vo., Manch., 1841. PERKINS, *Answer* to their report, 8vo., Lond., 1841. DAVIES and RYDER, *Reply to Perkins's Answer; Report of W. Fairbairn*, 8vo., Manch., 1841. Pamphlet by BACON on the system, 1876.



"As there are no means of regulating the temperature in hermetically sealed pipes, so there can be none for limiting the pressure which they sustain.—An apparatus which to all appearance, therefore, is perfectly safe at any given time of inspection, may, in a few minutes afterwards, have the pressure so much increased by adventitious circumstances, as to render it extremely dangerous; and each day that it is used must add to its insecurity, in consequence of the pipes which form the coil continually becoming thinner by the action of the fire. The high temperature of these pipes has also frequently caused

inflammable materials to take fire, and repeated accidents have occurred in this way;" HOOD, *Warming*, etc., 8vo., Lond., 1855, 3rd edit., p. 126-37. BUILDER *Journal*, for June 20, 1850.

"A method of warming and ventilating apartments and warehouses", by a large stove, invented by Jacob Perkins of London, is described in MECHANICS' MAGAZINE for 1823.

PERMANENT SET. A fixed deflection of a beam or girder, owing to its having been overweighted, hence it is considered permanently injured to that extent. DEFLECTION. Mr. Dines having proved about 8,000 girders for Thomas Cubitt, had found that a permanent set was induced at one-twentieth of the breaking weight; indeed, it was scarcely possible to place the least weight upon cast iron without producing a permanent set. H. Grissell maintained that good iron never acquired a permanent set; bad iron might do so. HODGKINSON, *Experimental Researches—on Iron, etc.*, 4to., Lond., 1840, p. 381, states "A set was visible with $\frac{1}{5^{1}\frac{1}{7}}$, and in the other case with $\frac{1}{8^{1}\frac{1}{0}}$ of the breaking weight; showing there is no weight, however small, that will not injure the elasticity. The absence of a permanent set was, therefore, the exception, not the rule." INST. OF CIVIL ENGINEERS, *Proceedings*, 1854, xiii, 471-2.

PERMANENT WHITE, CONSTANT WHITE, or BARYTIC WHITE. A sulphate of Barytes; when well prepared and free from acid, it is one of the best whites for water-colour painting, being of a superior body in water, but destitute of this quality in oil. It is, however, seldom well purified from free acid, and, therefore, is apt to act injuriously on other pigments. BARYTES. 9.

PERMEABILITY. The capacity of any substance to transmit moisture under ordinary conditions of atmospheric pressure. All *stones* used in building are permeable, but some are much more so than others; and some stones which are perfectly dry in a north or north-east exposure, cease to be so where a driving south-westerly wind in a rainy district is constantly acting on them. Such action permanently increases the permeability of some kinds of stones, and even of rocks so hard as granite. Of *limestones*, those of Bath, and generally the shelly oolites of the middle of England, and all kinds of chalk, are the most permeable; good Portland stone, the *ragstones*, crystalline limestones and compact semi-marbles, the least. Of *sandstones*, the new red from almost all English localities is distinctly permeable. The cretaceous sandstones are less so. The millstone grits and coal grits are of variable quality in this respect. The well-known Craigleith stone (a sandstone of the carboniferous period) and other compact grits, and all quartzites and good *slates*, are almost impermeable. D. A.

Pettenkofer's important experiments on permeability are noticed in the Catalogue of the Russian Section of the Paris Exhibition 1878. *Stone preservative processes*, in *Sessional Papers* of Roy. Inst. of Brit. Architects, 1861; and *On Artificial Stone*, 1863.

PERNAMBUCO. A seaport in Brazil. "It was taken by the Dutch in 1630, and remained in their possession until 1654; they did more for its public works in that short period than has been done since" (1840). HENDERSON, *Hist. of Brazil*. PENISTON, *Public Works in Per. in the empire of Brazil*, read at INST. OF CIVIL ENGINEERS, *Transactions*, 1863; and printed in CIVIL ENGINEER, ETC., *Journal*, xxvi, 142. 14. 50.

PERNAMBUCO WOOD; see BRAZIL WOOD.

PERPEN; see PERPIN.

PERPENDER. A term applied to a coping stone. 17.

PERPENDICULAR; RESTORING TO THE: or to the upright. The campanile at the church of S. Biagio, at Cento, in Italy, which had inclined 5 ft. 6 ins., was forced upright by A. Alberti, *cir.* 1455. Alfonso Parigi, *cir.* 1620, restored the wall of the second floor of the palazzo Pitti at Florence, which had inclined about 8 ins. 3.

The lofty tower of the Laurentius church, Rotterdam, declined 1651 three and a half feet: it was rectified by K. J. Persoons. In 1713 N. Hawksmore directed the operations for screwing up the north front of the transept of Beverley minster, Yorkshire, which had overhung 4 ft. Two plates of the machinery were published 1739, with the names of the carpenter W. Thornton, invt., and Ed. Geldart, delt. The explanation of the method adopted in 1829 by J. B. Papworth, to confine the lateral walls, then inclining outwards, of Trinity church at Clapham, Surrey, is given in SURVEYOR, ENGINEER, ETC., *Journal*, 1843, iv, 187, with an illustration. The west front of the nave, together with adjoining portions, of Croyland abbey, Lincolnshire, was restored 1860 by Sir G. G. Scott: the south-west angle inclined to the west 2 ft. An account of the works is given in ASSOCIATED ARCHITECTURAL SOCIETIES' *Reports and Papers*, 8vo., Lincoln, 1861, vi, 25. The south wall of the nave of S. Alban's abbey, 2nd May 1878, as recorded in BUILDING NEWS *Journal*, xxxiv, 537, and earlier, by Sir G. G. Scott; and BUILDER *Journal*, xxxvi, 465. Boxgrove abbey and Selby church, Yorkshire, are other instances of a smaller kind.

PERPENDICULAR LIFT; see HOIST.

PERPENDICULAR PERIOD. The term adopted by RICKMAN for the latest variation of mediæval architecture in England, succeeding to the Decorated period. It comprises the *Ornamented English* about 1300-1460, and *Florid English* or *Tudor Style* 1460-1537 of Millers; *Ornamental and Florid Gothic* of Warton, and Dallaway; *Third Order* of Milner; *Third Period of the Pointed Style*, and *Highly Decorated or Florid English*, 1461-1509, of Britton; *Fourth Period* of Repton; *Third Class of Pointed Architecture* of Cottingham (*Henry VII's chapel*, introd.); *Late Complete Gothic* of Petit, Whewell, and Willis; *Third Pointed* of the Ecclesiological, late Cambridge Camden, Society; *Late or Continuous Gothic* of Freeman; and *Rectilinear Gothic* 1360-1550 of Sharpe. (The corresponding styles; Fr. *Style ogival tertiare* of DE CAUMONT; also called *Gothique Flamboyant*, and sometimes *Burgundian;* Ger. *Germanischer* or *Spätgermanischer styl.*)

Buildings erected later are noticed under POINTED ARCHITECTURE (LATE); TUDOR; ELIZABETHAN AND JACOBEAN; and ITALIAN: also FLAMBOYANT; and FLORID.

RICKMAN says, "The name clearly designates this style; for the mullions of the windows, and the ornamental panellings, run in perpendicular lines, and form a complete distinction from the previous or Decorated style. Many buildings are so crowded with ornament as to destroy the beauty of the design. The carvings are generally very delicately executed"; *An Attempt*, etc., 5th edit., 1848, p. 55. But BRITTON, *Chron. Hist. of Christian Arch.*, 4to., Lond., 1821-26, p. 170, says, "The term gives no idea of the increased expansion of windows, the gorgeous fan-like tracery of the vaultings, the heraldic nature of the enrichments, the horizontal lines of the doorways, the embattled transoms of the windows, nor of the vast pendants suspended in mid-air, that constituted such important features in this class." "The moving cause for the change," writes STREET, s. v. "Architecture", in ENCYC. BRITT., 9th edit., "was a sense of disgust at the vagaries into which the votaries of curvilinear window tracery had been led—. Edyngton and Wykeham did not return to earlier forms, but corrected this exuberance (of tracery) by introducing vigorous straight vertical and long lines." ECCLESIOLOGIST *Journal*, 1846, v, 228; FREEMAN, *History of Arch.*, 1849, p. 377.

The east and west of England have been considered as the two parts where Perpendicular architecture grew to perfection, and into very distinct and marked styles. The great preponderance of Flamboyant work in Yorkshire compared with the south, is noticed in the ECCLESIOLOGIST *Journal*, 1849, ix, 246. It has been assumed by some writers, as in the same *Journal*, v, 235, 241, that William of WYKEHAM, bishop of Winchester, was the inventor of this Perpendicular architecture: but WILLIS, at the Gloucester congress of the Archæological Institute, 1860, stated that he believed the cathedral there, and that district, to have been the school of the Perpendicular style, as it was there shown of a more early date, *cir.* 1338, from authentic records,

than in any other spot; (BUILDER *Journal*, 1860, xviii, 479; and 511); the earliest other example is the great west window at Winchester cathedral put up by bishop Edyngton (1346-66); its date is much doubted by others (FREEMAN, *History*, 378): the vaulting of S. Andrew's aile in Gloucester cathedral was the earliest in it; and the magnificent vaulting of that building led to fan-vaulting, a noble example of which is in the cloisters, and is entirely peculiar to England; it is clearly dated 1360; and it may be assumed, therefore, that this school of masons produced fan-vaulting.

RICKMAN, *Attempt*, etc., 8vo., Lond., 1848, 5th edit.; and FREEMAN, *History of Arch.*, 8vo., Lond., 1849, p. 376, enter minutely into the characteristics of the details in England. The strength of the walls lost by the vast space devoted to glass is compensated by the depth of the *buttresses*, which are made of much greater projection, and have a larger number of stages, crowned by heavy pinnacles. In large buildings the *triforium* or gallery is replaced by panels, or niches, or entirely removed. The *clerestory* is a marked feature of the period, from the great number, and size, of the windows it contains. It was often added to small churches where it had previously no existence; and it was reconstructed on similar principles in large ones. Although the *four-centred arch* is much used, yet in panel work, arches from a thin lancet to an almost flat segment, are found. Jamb mouldings are often continued in the arches without the interposition of capitals. The *capitals* are usually of mouldings only, yet frequently ornamented with sculpture, either of foliage or figures. A chamfer plane for *mouldings* was common; immense "casements" were used in the jambs. *Panelling* was a grand source of ornament. In the flint counties, the panelled work is filled in with that material, as at the fine instance of S. Michael Coslany church, Norwich. The larger exterior *doors* have almost constantly a square head over the arch mouldings, the spandrel filled with some ornament; and usually with dripstones over them, as had also most of the smaller ones. The *timber roofs* of this period are often very grand, as at Westminster Hall, 1395-9; Crosby Hall; the hall at Christchurch college, Oxford, etc. HAMMER BEAM ROOF. FAN and pendant stone VAULTING. The ruined chapel in S. Lawrence church, Evesham, has "a roof very clear and good in its details; it is one of the most beautiful specimens of small fan tracery roofing with a pendant in the kingdom": view in RICKMAN, *Attempt*, 4th and 5th edits. *Crypts* are very rare; there are two examples in the Bristol churches. "The square *tower* with its capping of battlements and pinnacles—is peculiarly English. It appears of every degree of plainness or richness, from the late Decorated to the very extinction of Gothic"; PETIT, i, 209. The land of enriched Perpendicular towers is the west of England, as in Gloucestershire, Wiltshire, and Dorsetshire; they attain their culminating point in Somersetshire.

Bishop Edynton's chantry in Winchester cathedral is the first that was erected distinct between the piers. Later and rich examples are Greenwaye chantry, Tiverton, 1517; Speke chantry, Exeter cath., *cir.* 1520; and Lane chantry, Collumpton, 1528.

Among the superb monuments of this period, the first place is due to the nave of Winchester cathedral. The transition church at Edington, Wiltshire, dates 1352-61; the cloisters at Westminster abbey, 1350-66, "very superior in character, and very elegant in the mouldings" (SCOTT, in BUILDER *Journal*, 1859, p. 852); the eastern half of the choir at York, 1361-67; the chapel and cloister at S. Martin's-le-Grand, London, had 1367 been "restored in a new form of wonderful beauty"; Wymington church, Bedfordshire, dates *cir.* 1390. The churches at Coventry, of S. John Baptist, of the Holy Trinity, and of S. Michael 1434-90, and St. Mary's Hall: the land for S. John was given 1344, and the church consecrated 1350; the clerestory is advanced Perpendicular work, and may have been erected some fifty years later. The Benedictine abbey of S. Mary, Sherborne, Dorsetshire, is, in many respects, one of the finest examples of Perpendicular work in England, 1436-1510 (?). Of late character are, 1443, King's college chapel, Cambridge; 1502-20, Henry VII's chapel; and 1476, S. George's chapel, Windsor. One of the latest works in the style is Bath abbey church, commenced about 1499, and completed 1616. Fotheringay church has been stated to be one of the best examples in the kingdom for the study of the style.

SEDDING, *Sixteenth Century English Gothic* 1500-30, read at Roy. Inst. of British Architects, 13 March 1876. SCOTT, *Lectures*, 8vo., 1879. The *Domestic architecture* of the XV century is elucidated in TURNER and PARKER, *Dom. Arch.*, 8vo., Lond., 1859. 14. 17.

In *Scotland*, a strong tendency to flamboyancy characterises the window tracery of nearly all the churches of this period—. Properly speaking, only two Pointed styles exist in Scotland, viz., First Pointed (confined to cathedral and monastic structures); and that (chiefly collegiate) containing a greater proportion of genuine Middle Pointed character (though not erected until about the middle of the XV cent.) blemished by infusions of debased First and Third Pointed features, both English and French; *Descriptive Notes—Churches of Scotland*, 8vo., Lond., 1848. "The Perpendicular style really finds no exact parallel in Scotland, although the style exists there most decidedly; Melrose displays the Flamboyant curves more immediately common to France than England; it is equally interesting for Perpendicular features. The east ends of Linlithgow and Stirling churches are undoubted examples. None of the specimens exhibit the four-centred arch. The round arch appears in the Perpendicular cloisters at Melrose"; BILLINGS, *Baronial, etc., Antiquities*, 4to., Lond., 1852. Roslyn chapel dates 1466-80. The domestic architecture which is distinctly national and of great beauty and picturesqueness, is treated in TURNER and PARKER, *Domestic Arch.*, 8vo., Lond., 1859, iii, 385-95: and STREET, s. v. Architecture, in ENCYC. BRITT., 9th edit.

The style used in *Irelund* is considered to have no features in common with the Perpendicular of England, or the Flamboyant of France: its details and edifices are named s. v. Irish Architecture. BLAKE, *Remains of Kilconnel Abbey*, read at Roy. Inst. of Brit. Archts., 1857-8, p. 136-142. WILKINSON, *Geology of Ireland*, etc., 8vo., Lond., 1845. *Domestic Buildings*, in TURNER and PARKER, 8vo., London, 1859, iii, 396-400.

The corresponding work on the *Continent*, as in France, is detailed s. v. FLAMBOYANT: in Belgium and Flanders s. v. FLEMISH: GERMAN ARCHITECTURE, to which it may be added that "the third period commenced with a healthy revulsion, but it ended in being spiky, or prismatic as it is sometimes called. Everything that could be curved was bent or twisted; the most tortuous forms of the Flamboyant system are common with truncated ends forming "stump tracery"; interpenetration abounds; and as a last resource of invention, dead branches intertwined take the places of mouldings and of foliage. This forms a marked national character of the style", as remarked in GWILT, *Encyclopædia*, 1867, which gives a list of examples in chronological order, with their dates and names of the architects attached.

PERPETUAL CURACY. The origin of a perpetual curacy was the statute 4 Henry IV, c. 12. It is a living where there is in a parish neither spiritual rector nor vicar, but a clerk employed to officiate there by the impropriator. PHILLIMORE, BURN, *Ecclesiastical Law*, 8vo., Lond., 1842, ii, 54-5. 13.

PERPÉTUE, sixth bishop of Tours, consecrated in 460, in the reign of Childéric, pulled down the little chapel built by Brice, and raised in its place a basilica, 160 ft. long, and 60 ft. wide. He rebuilt the basilica of S. Pierre et S. Paul, built by S. Martin, and replaced in it the timber vault of the old church. GRÉGOIRE DE TOURS, *De gloria martyrum*, liv. ii, c. 14 and 15; liv. x, c. 31. RAMÉE, *Hist. Gen. de l'Arch.*, 8vo., Paris, 1843, ii, 113-4

PERPETUITY. The technical term for a yearly payment or

annuity which is to continue for ever. It is also called a perpetual annuity. 14.

PERPIN, perbend, perpend, perpent, perpender, and perpeyn; and PARPAING. A "perpin stone" was one that was faced on both ends. Such work was called "perpin ashlar"; a term still applied in Gloucestershire and Yorkshire to a wall built of single stones thus dressed. It is so used 1605 for a partition, in CHETHAM SOCIETY, *Shuttleworth Papers*, i, 161. Where the stone only passes part of the way through a wall, it is termed a "binder". The term "perpeyn wall" occurs in the contract for Fotheringay church, for the short walls from which the pier arches spring at each end. The epithet may be intended to apply only to the front edge of the wall which carries the shaft and side moldings. The term "perbend" is now applied, as a contraction of "perpendicular", to the joints in brickwork on ranging over each other in the alternate courses. 16. 17. 19.

PERPIÑAN (Engl. and Fr. PERPIGNAN). The capital of the department of Pyrénées Orientales, and formerly that of the province of Roussillon. Almost all the buildings date from the Spanish rule previous to 1659, when the town was ceded to France. The citadel was commenced by Charles V (1364-80); in the donjon is a double chapel, one above the other; a doorway is Saracenic. Luis Pizano and Micer Baltasar, both engineers of Padua, and Henrique Gilabert, 1535, were employed on the fortifications. The bishopric was created 1604. The cathedral dedicated to S. Jean le Baptiste (or S. Juan), begun 1324, had a western bay added under Louis XI and Charles VIII (1461-98). It is built of marble, and consists of a nave only, 60 ft. wide, brick vaulted, finished 1509, and a west façade dating 1577. There is no porch. The plan was perhaps designed by G. Sagrera, master of the works, at the beginning of XV cent., according to STREET, *Gothic Arch. of Spain*, 8vo., Lond., 1865, p. 337. The mediæval organ is noticed by VIOLLET-LE-DUC, *Dict. Rais.*; and by NODIER. The ruined church of S. Jean le vieux is Romanesque; and that of the Dominicans, now a store, is partly of the same date. *Le loge*, formerly the *bourse* (Moorish), is of the end of XIV cent., and has an arcaded interior court. There are several good old houses. NODIER and TAYLOR, *Languedoc*, fol., Paris, 1833-42, ii, give many illustrations. CERVIN et MELLING, *Pyrénées*, fol., Paris, 1826-30, give, 147-8, pl. 66, the porte Nôtre Dame; and both works give the remarkable bridge at Ceret. JALABERT, *Géographie du département des Pyrénées-Orientales*. 14. 50. 28. 66. 96.

The mode of constructing flat arches, peculiar to Perpignan, is described in ESPIE, *Securing Buildings from Fire*, 8vo., Lond., 1755, p. 25, et seq.

PERPINAN (BERENGARIUS II, bishop of), 1019 visited the Holy Sepulchre, and on his return built a church like it at Perpiñan. SAINTE MARTHE, *Gallia Christiana nov.*, fol., Paris, 1715-85-1865, vi, 1039-40.

PERPINAN; Bois de. See CELTIS AUSTRALIS.

PERRAC (ETIENNE); see DUPERAC (E.).

PERRACHE (.....) of Lyon, took up 1771 the scheme of Guillaume de l'Orme, and drained a large piece of marshy land, called isle Moignat, altering the junction of the two rivers, thus adding largely to the extension of the city. It is still called the quartier Perrache. *Guide*, fol., 1853.

PERRAN ZABULOE, or S. Peranus, Peran, Piran, or Pyran. A very early church erected in the hundred of Pydar, Cornwall, rescued from the sands 1835 by William Mitchell of Compregny, near Truro, after having been embedded for about 700 years. The CHURCHMAN *Journal*, and CIVIL ENGINEER, ETC., *Journal*, 1840, iii, 90. HASLAM, *Perran Zabuloe*, 8vo., Lond., 1844. ALL THE YEAR ROUND *Journal*, April 1869, New Series, i, 474. The BUILDING NEWS *Journal*, 1871, p. 462, states that the building "is nearly all carried away by tourists". CHURCH BUILDER *Journal*, 1878, p. 89.

PERRARD or PÉRARD (.....), of Montreuil, a pupil of L. Moreau and of Boullée, was one of the architects to the comte d'Artois. He designed 1781 at Paris, the rotonde du Temple, or portiques du Temple, an isolated building of shops, 37 toises in length, with an interior court; LEGRAND and LANDON, *Descr. de Paris*, 8vo., Paris, 1809, iv, 26. He also designed the hôtel de Bénévent, in the rue d'Anjou S. Honoré; and the one at the corner of the rue du Houssaye and de Provence. Perrard was also architect to the grand prieuré de France. LANCE, *Dict. Biog.*, 1872.

PERRAT (PIERRE), succeeded 1374 to Jean Pollet at the cathedral at Metz: he altered its plan, changed the heavy mullions in the windows for lighter ones, covered the nave, formed the clerestory above the portail; and united the cathedral with the church Nôtre Dame de la Ronde. These works were finished 1392. Perrat died 4 July 1400, aged between 70 and 75 years, and was buried in the cathedral. His pupil and successor Thierry de Sierck designed the tomb, comprising a kneeling figure of his master, with an inscription, which names him as "masson, maistre de l'ouvraige de la citeit de Mes et de l'esglise de Nostre Dame do Carme et de la grant esglise de Toult et de Verdun." BEGIN, *Cath. de Metz*, 8vo., Paris, 1846.

PERRAULT (CLAUDE), born 1613 at Paris, son of Pierre Perrault, avocat au parlement, studied medicine and the exact sciences, which latter, it is said, inspired him with a taste for architecture. About 1664 he proposed a plan for the completion of the Louvre, but Bernini was sent for from Rome to make a design, which being unsuccessful, Perrault, assisted by his brother Charles, solicited and obtained the employment. During 1665-80 he erected the colonnade, called "the peristyle", and the two end façades; the execution of the designs was entrusted, it is said, to Levau and d'Orbay, hence the design has been often attributed to the "premier architecte" Levau, as in LANCE, *Dict. Biog.*, 1872; also that they were "really suggested by the designs of B. Androuet du Cerceau, and of Bernini"; the sculptures are by Goujon and by Ponce. DONALDSON, in *Sessional Papers* of Royal Inst. of British Architects, 1853-54, p. 80. PATTE, *Mémoires*, 4to., Paris, 1769, gives details of construction, p. 269 and 319-41. LEGRAND et LANDON, ii, 21; 36-40. VITET, *Le Louvre*, 8vo., Paris, 18 . BLONDEL, *Cours*, 8vo., Paris, 1771, iii, 65, 180, 197; pl. 6, 38, 40. BLONDEL, *Arch. Franç.*, fol., Paris, 1752-56, iv, 6, with his designs for connecting the Louvre and the Tuileries. SAUVAL, *Hist.*, fol., Paris, 1724, ii, 63. GABRIEL. FONTAINE.

Perrault designed 1667-72 the observatory at Paris, executed by Jean le Grand. ARAGO, *Report* made to the chamber of deputies, and translated in CIVIL ENGINEER, ETC., *Journal*, 1844, vii, 380-3. GOURLIER, etc., *Choix d'édifices*, fol., Paris, 1825-50, ii, pl. 256-8. LEGRAND, etc., iii, 37. DOPPELMEYER, *Atlas Celestes, cir.* 1770: also in Perrault's VITRUVIUS. BLONDEL, *Arch. Franç.*, ii, 57. Colbert procured 1667 designs from Lebrun, Levau, and Perrault, for the arc de triomphe du Trône; that by the latter was preferred; the first stone was laid 6 August 1670, but not carried on; BLONDEL, *Arch. Franç.*, ii, 137. He designed at Versailles the bosquet des bains d'Apollon in the park, l'allée d'eau, and the greater part of the marble and bronze vases which decorate the gardens: and executed at Paris 1678 the restoration (LEGRAND, etc., i, 161), with the chevet of the choir (the desecrated church is sometimes attributed to him) of S. Benoît le Betourné; the chapel of the château du Sceaux; and the altar (chapel, in BLONDEL, *Cours*, i, 99) of N. D. de Savone, in the right transept of the church des Petits Pères in the place des Victoires. Among several designs he gave one for a new church of Ste. Geneviève; and a portal (Gothic) with Lebrun at S. Germain l'Auxerrois.

Besides other works he published;—*Les dix livres d'Architecture de Vitruve*, fol., Paris, 1673; 1684, 2nd edit., enlarged; and later editions; augm. par TARDIEU et COUSSIN, 4to., Paris, 1837; 1859; transl. 12mo., Lond., 1692; etc.: *Ordonnances des Cinq Espèces de Colonne selon la Méthode des Anciens*, 4to., Paris, 1676; translated by J. JAMES, *Five Orders of Columns*, etc., fol., Lond., 1708, and by J. STURT, 1722. *Explication*

des modèles de Machines que l'on expose dans la rue de la Harpe, 4to., Paris, 1683: and *Parallèle de l'Architecture Antique et de la Moderne*, etc., fol., Paris, 1702. Perrault left a number of drawings relating to the Louvre, Tuilleries, Versailles, etc., which his brother Charles formed into two folio volumes; and were in existence up to 18 . He was a member 1673 of the academie royale des sciences; died Oct. 9, 1688, aged 75 years, at Paris, and was buried in the above-named church of S. Benoit. His son ANDRÉ was in 1703 controleur des batiments du roi.

BLONDEL, *Cours*, 8vo., Paris, 1771-77, v, 134; vi, 504. LAMBERT, *Histoire Littéraire*, 4to., Paris, 1751, iii, 100. PERRAULT, *Hommes Illust.*, fol., Paris, 1696-1700. BLONDEL, *Homme du Monde*, 8vo., Amst., 1774, ii, 290, 292; Q. DE QUINCY, *Vies des Arch.*, 8vo., Paris, 1830, iii, 207. HERLUISON, *Actes d'Etat*, 8vo., Orleans, 1873, p. 337. 3. 5. 14. 25. 34.

PERRAULT (CHARLES), born 1646 (LANCE; 12th Jan. 1628 in PENNY CYCLOPÆDIA) at Paris, brother of Claude, was contrôleur général des bâtiments du roi, etc.; and secretary to Colbert, for whom he drew up the regulations for the academy of painting, sculpture, and architecture. He published *Parallèle des Anciens et Modernes, en ce qui regarde les Arts et les Sciences*, 8vo., Paris, 1688; 1692, 2nd edit.; 8vo., Amst., 1693; 1696; fol., 1702; and *Les Hommes Illustres—pendant le XVIIe siècle*, fol., Paris, 1696-1700; the 2nd edit., contains *Eloge de Claude P.*, with a portrait; "englished by T. OZELL", 8vo., Lond., 1704: and three other works. He died at Paris 16 March 1703, aged 78 years: and was buried in the church of S. Benoît. VIRLOYS, *Dict.*, 1770, states he was born in 1627, and died 10 May 1705, aged 78 years. LANCE, *Dict. Biog.*, 1872, says 17 May 1703; and another, 16 May, aged 75 years, and had a son Charles. PATTE, *Mémoires de C. P.* (referring also to Claude P.), 12mo., Avignon, 1759. LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, iii, 107. 14.

PERRÉAL (JEAN), called Jean de Paris, of Lyons, was painter and "valet de chambre ordinaire du roi", as well as architect to king Charles VIII, Louis XII, and François I, the first of whom he accompanied 1495 in his Italian campaign. For Marguerite of Austria he designed between 1506 and 1511, when the first stone was laid, the church at Brou, in memory of her husband Philibert III of Savoy; also the models for the statues and monuments. M. Colombe (died 1512) had the direction of the works of the church, and "executé ses patrons selon le pourtraict et tres belle ordonnance faite de la main de Jehan Perréal de Paris". The contract is given in BORDIER et CHARTON, *Histoire de France*, 8vo., Paris, 1860, i, 124-5; and the tomb of Philibert, p. 120. He was succeeded 1513 by Loys van Boghem, or Wamboglem, of Belgium, to whom the design is attributed by some authors, and continued by A. Colomban of Dijon. Perréal died soon after 1527. PERICAUD, *Notice sur Jean Perréal*. RENOUVIER, *Jehan de Paris*. DIDRON et DUPASQUIER, *Monographie de N. D. de Brou*, fol., Paris, 1854, p. 42.

PERRIN (GUILLAUME), was master of the works at the church of N. D. de Bourg-en-Bresse from about 1509; he obtained a livery in 1521, and an increase of salary in 1528. The works were stopped 1545, and only continued 1652 by Maugras of Lyons. BAUX, *Notice*, etc., 8vo., Bourg, 1849, p. 22, 54, 60, 62, 67, and 73.

PERRON. The French term for an unenclosed flight of steps formed before the entrance to a story raised somewhat above the level of the ground: and the balcony landing of a staircase at the top of a double flight of steps meeting at each end of such a landing. The French use the terms *perron à pans*, *perron ceintré*, *quarré*, and *double*, according to the arrangement of the steps. De l'ORME, *Architecture*, mentions the "grand perron" in the cour du cheval blanc (en fer de cheval) at the château at Fontainebleau, as one of the finest works he had seen. The ancient perron at the maison du roi at Bruxelles is shown in SCHAYES, *Hist. de l'Art*, 8vo., 1850-3, iv, 65. The history of Liége affords an example of the importance in mediæval times of the perron, whether applied to the staircase itself, or to the fir-cone as representative of the rights of the stairs; DUMAS, *Charles the Bold*. BLONDEL, *Cours*, iv, 295-6; D'AVILER, *Cours*, 4to., Amst., 1699, p. 185 of *Termes*. 5. 25.

PERRONET (JEAN RODOLPHE), born 1708 at Suresnes, near Paris, entered the office of Debeausire of that town. In 1745 he became inspector of the school of engineers, and in 1747 first engineer in the ponts et chaussées; and had many honours conferred upon him. BLONDEL, *Discours*, 1754, p. 27, states that at Alençon he designed the hôtel de ville, and reconstructed the parish church destroyed by lightning. The bridges designed by him comprise those of Orleans 1750-60; Mantes 1757-65; Nogent 1766-91; Neuilly 1768-74 (the first horizontal roadway, and with elliptic arches of the widest span then known); Ste. Maxence 1774-84; Louis XVI, afterwards de la revolution, and now de la Concorde, 1787-91; and Nemours 1805. Many of these are published in his work, *Description des projets et de la construction des ponts, etc.*, 75 pl., 2 vols., fol. and 4to., Paris, 1782-89; 1788; 1793: *Ponts et Chaussées, suppl. des œuvres de P.*, fol., Paris, 1789: *Mémoire sur la recherche—pour construire de grand arches de Pierre de deux cents, etc., d'ouverture, etc.*, 1 pl., 4to., Paris, 1793: the *Mémoire sur la cintrement et le décintrement des ponts*, 3 pl., 4to., Paris, 1809, was issued after his death, 27 Feb. 1794, at Paris, aged 85 years. Besides these, he formed many fine roads, the canal of Burgundy, and other works. LESAGE, *Notice pour servir à l'éloge de J. R. P.*, with a portrait, 4to., Paris, 1805.

PERRUQUE; STYLE: (Ger. *zopfstil*). The name given by some critics, as by HOFFSTADT, *Gothisches A B C buch*, fol., Frank., 1840, p. 164, the *verschnörkelungs periode* of NAGLER, *Dict.*, s. v. Gabriel; the *rococo* of the *Complément* to the *Dictionnaire* of the *Academie Française*; to the debased style which prevailed 1685-1785 in France; see LOUIS XV (STYLES OF). The mansions in the faubourg S. Germain, at Paris; and the cabinet des médailles at Versailles, 1735 or perhaps nearer 1705, are given as examples in France; and the church at Friedenstadt 1601-8, and the Georgskirche at Coblenz 1618, in Germany.

PERSÆ. After the overthrow of the Persian army at the battle of Platea, B.C. 479, the spoil was "applied in the erection of the Persian portico, and as an appropriate monument of the victory—its roof was supported by statues of the barbarians in their magnificent costume—. This is the origin of the Persian order for the support of an entablature"; VITRUVIUS, 1, i. PAUSANIAS, iii, 2. Four figures, *persæ*, appear in the portail du palais Otto Henry, at Heidelberg; *cir.* 1545; RAMÉE et PFNOR, *Monographie*, fol., Paris, 1859, pl. 2: HAGHE, *Sketches*, fol., pl. 2. TELAMONES.

PERSECCHINO BRECCIA, peach blossom breccia, is very fine with large white, red, and rose spots. There is a variety with small spots. BRECCIA.

PERSEPOLIS, called by the natives Takht-i-Jamsheed, and by the Mahomedans Chehil or Tchil-Minar or Forty columns. The capital of the Persian empire after the time of Alexander I (498-455 B.C.) situated in the province of Farsistan or Fars, the ancient Persis. Its early history is unknown. Alexander III burnt B.C. 332 the palace with part of the city, erected about 50 years after the death of Cyrus. A notice has been found that Cambyses sent architects to Persepolis from Egypt. The ruins are noticed at great length in KER PORTER, *Travels*, 4to., Lond., 1821-22, i, 576; he considers that the city extended along the whole foot of the mountain, connecting itself with Naksh i Roustam (MOURGAUB), and thence spreading over the plain to the north-west. A great terraced platform, even now from 14 to 40 ft. above the plain, is 1,425 ft. long from north to south, 926 ft. wide on the north, and 802 ft. on the south, sides; this is ascended to from the plain, near the north-west corner, by a grand marble staircase, without decoration, about 22 ft. wide, having a double return flight of easy acclivity; DE BRUYN, TEXIER, and RAMÉE differ very much in the dimensions of this staircase. At the back of this platform rises a steep rock, in

which were cut the tomb chambers of the kings. Facing the staircase are the ruins of a columnar building, called the propylæa of Xerxes, having gigantic winged animals, much resembling the Assyrian, to each portal. Another grand flight of steps, with sculpture in three tiers, led southwards up from the platform to another, on which stood the great hall facing northwards, built B.C. 486, about 300 ft. by 350 ft., now called Chehil Minar, which had 60 or 72 pillars (only 10 are standing) with bull-headed capitals. Still further south are the remains of the smaller halls or palaces of Darius, built B.C. 521, and of Xerxes. Eastward is a ruined building 210 ft. square, having two entrances on each side, but without columns; there are also many other ruins. The buildings were repaired B.C. 405 to 360 by Artaxerxes Mnemon.

The columns of the Chehil Minar are of grey marble 5 ft. 9 ins. diam., and vary in height from 60 ft. in front to 67 ft. 4 ins. in the central division; on some of the shafts is a kind of zigzag pattern, others are fluted. The capitals, formed partly by double headed animals, on the western division, are 7 ft. high and 12 ft. 2 ins. wide, while the shaft, 54 ft. 10 ins. high, is composed of four blocks. As to a restoration, FERGUSSON has formed a very grand design, using enclosing walls, with an upper story; but KER PORTER, FLANDIN and COSTE, and TEXIER, differ entirely, conceiving that the groups of columns were isolated and simply screened by curtains; that the centre division had a flat roof with an opening, which superstructure was entirely of wood, as no fragment of a stone cornice, lintel, or tile, has been found. There are also the remains of several buildings on the plain, and within the precincts of the town of Istakr, at Tacht e Taoosht, is a building still called the haream of Jemsheed (MOURGAUB), which may have been the residence of the Achæmenian (or early) kings; it certainly belongs to their age. 1. 2. 6. 14. 25.

FERGUSSON, *Ill. Handbook*, 1855, and *Hist. of Arch.*, 1865. BONOMI, *Nineveh and its Palaces*, 8vo., Lond., 1852, gives a general plan, etc. GAILHABAUD, *Monumens*, fol., Paris, 1842-52, i, pl. 8. FLANDIN et COSTE, *Perse Ancienne*, fol., Paris, 1842-54, pl. 57-81. TEXIER, *Arménie*, fol., Paris, 1842-52, pl. 91-145. VAUX, *Nineveh and Persepolis*, 4th edit., 8vo., Lond., 1855.

W. PRICE, *Persia and the Antiquities of Persepolis*, 56 pl., fol., Lond., 1825, 2nd edit. NIEBUHR, *Reisebeschreibung*, etc., ii, 121, etc., with plan and other details. *Perscpolis Illustrata*, 21 pl., engraved by Kip, in the UNIVERSAL HISTORY, fol., 1739. RICH, *Narrative of a Journey*, 8vo., Lond., 1839. MAURICE, *Obs. on Ruins of Babylon*, etc., 8vo., Lond., 1816, p. 199-200; 1839. CORN. LE BRUN, *Voyage*, fol., Amst., 1718, p. 261; 437, fol., Paris, 1725. CHARDIN, by Langlès, *Voyages en Perse*, fol., Paris, 1811, viii, 24, 53, 62, 66, 302. MYERS, *Remains of Lost Empires*, 8vo., 1875, p. 319. BUILDER *Journal*, 1873, xxxi, 364.

PERSIAN ARCHITECTURE. Ancient Persis is represented by the present province of Fars or Farsistan. Besides PERSEPOLIS, now Istakhr, the capital of Darius, of Xerxes, and later Achæmenian kings; and PASARGADÆ, the royal city of Cyrus and Cambyses, B.C. 560 to 522; are, the ruins at SHAPUR; at MOURGAUB, the tomb of Cyrus; NAKSH I ROOSTAN or Rustam, the tomb of Darius; and Naksh i Rejib, also with tombs of the kings of the Sassanian dynasty; and ruins situated near FIROUZABAD or Mammida. Other chief places are ECBATANA or Hamadan, the summer residence of Cyrus after B.C. 550; SUSA his winter residence; SELEUCIA; BAGHDAD; BABYLON and Hillah; CTESIPHON or El Madain with the Tâk Kesra; SHIRAZ; SEGISTAN; YEZD; ISPAHAN; TEHERAN; Rhey (RHAGES); SULTANIYAH; sculptures at Takt i Bostan; BISUTOUN, Besitoon or Besutun; KONKOBAR or Kangovar; SOGDIANA; Azerbijan or TABRIZ; and ARMAVRA or Karakala. (MEDIAN ARCHITECTURE).

The chronology given s. v. BABYLONIAN ARCHITECTURE is here continued from 538 B.C., the conquest of Babylon by Cyrus, who placed Darius, a Median, as viceroy in that capital until he himself ruled there in 532, and founded the Achæmenian dynasty; 529 Cambyses II; 522 Smerdis (Bardes); 521 Darius Hystaspes; 486 Xerxes; 465 Artaxerxes; 424 Darius II (Nothus); 405 Artaxerxes II (Mnemon); 359 Artaxerxes III (Ochus); 338 Arses; 336 Darius III (Codomannus). In 331 Alexander of Macedon (died 323) by his victory at Arbela, founded the Grecian dynasty. To this succeeded the Arsacidæ or Parthian (thirty) monarchs, B.C. 250 to A.D. 226, when the battle of Hormazd allowed the Sassanidæ to succeed, commencing with Ardeshir or Artaxerxes, until 641: then succeeded the Mahommedan caliphs of Bagdad; the sultans of Ghizni, of whom the most famous was Mahmoud 900; the Seljookian dynasty which lasted 200 years; the Mogul dynasty, from 1206 founded by Halaku, son of Zinghis khan; the Tatars of Timourlung, 1387 to 1505; the Sefi dynasty, founded by Ismael shah from 1505 to 1722 (shah Abbas the great 1585 to 1627); and the Afghans, 1722; who after two or three years were expelled by Kooli khan, who took the name of Nadir shah 1725-53: then rose the Zund family, or Kerim khan and his five sons, 1753, defeated 1788 by Aga Mahommed khan; then reigned Futteh Ali shah 1798; Mahommed 1834; and Nasr-ul-din, 1848.

The cities of the Achæmenian dynasty are mentioned in the first paragraph; to the Sassanian period, FERGUSSON (*Handbook*, p. 367) attributes the palaces at Diabekr and Al Hadhr, built about 250; Serbistan about 350; Firouzabad about 450; palace at Ctesiphon (Tâk Kesra) about 550 by Khosru; conquest of Persia by the Arabs, 641; Mashita in the land of Moab, discovered by TRISTRAM (*Land of Moab*, 8vo., Lond., 1873), considered by FERGUSSON to have been built by Chosroes shortly before the Arab invasion. SASSANIAN ARCHITECTURE. "The greater part of the more ancient remains are columnar; not an edifice is built on the Assyrian plan, and the human-headed bull is the only reminder of the art of that country. The doors and windows resemble those of Egypt; but the sides of the portals are straight. By what stages the Persian architects arrived at their style, which was developed contemporaneously with that of Greece, is unknown; perhaps by gradual stages from the early structures of wood;" LEWIS, *Architecture*, in ENCYC. BRITT., 9th edit., 400. "It may have been a modification of the Assyrian Art, which afterwards gave birth to the Persian, for it was through Babylon that the arts appear to have penetrated partly, if not entirely, into Persia."—"The peculiar and highly tasteful style of the Persians, of which traces may still be seen in the remains of the celebrated palace of Chosroes at Ctesiphon, and in other ruins of southern Persia and Khuzistan, united with the Byzantine churches and palaces of Syria, produced the Saracenic. Already some such modifications had, I am convinced, taken place in Armenia by a similar process; the Persian and Imperial power being continually brought into contact in that kingdom": LAYARD, *Discoveries*, 8vo., Lond., 1853, p. 32-3.

"When the Arabs ceased to observe the strict precepts of their religion, and the disposition for dominion and luxurious living overcame them, they employed the Persian nation to serve them, and acquired from them the arts and architecture, and then they made lofty buildings: this was near the end of the empire;" Ibn-Khaldoon, quoted in LANE, *Modern Egyptians*, 5th edit., Lond., 1860. ARABO-PERSIAN; BYZANTINE-PERSIC, or Armeno-Persic; MAHOMMEDAN ARCHITECTURE.

From an early period, the influence of the Persian arts and sciences was drifting into Spain through the Syrian and Arab immigration 742-57, and during the reign of Haroun el Rasheed 786-809, his relations with the Spanish rulers were sufficient to account for the importation of strictly oriental fashions. In 936 the palace at Zahra or Azahra owed its construction to builders from Baghdad, as well as from Constantinople. Fatho ben Shakim el Omeya, builder of two mosques at Toledo 980 was celebrated for the attainments acquired in his frequent travels to the East.

"The architectural history of Persia," writes FERGUSSON, "is a complete blank for the first six centuries after the Hegira. The Persians were not temple builders. Haroun el Rasheed,

786-809, may, at Baghdad, have erected buildings, the germ of much of which now comes abruptly before us without our being able to trace it back to its origin—and we must pass on to the age of Ghengis khan (1205-27) before one certain example of Mahommedan architecture in this large district can be found." The imaret Oulou jami at Erzeroum, 1072-92 (or XII or XIII cent.); the small ruined mosque at Tabriz 1294; the tomb of sultan Khodabendah at Sultanieh 1303-16, with a dome 81 ft. diameter: the extensive works of shah Abbas (1585-1629) as at Ispahan and elsewhere, are named by him.

The modern edifices are monotonous and poor; the bricklayer with his wonderfully strong cement can arrange a flat roof or a cupola, above arches without centres, with great dexterity, and only of one story. The palaces exhibit vast spaces, enclosed by white masonry, and surmounted by crowds of domes, and are richly decorated. The throne room at Teheran is given in FERGUSSON, *Handbook*, p. 410: who also gives that of the Char Bagh at Ispahan, which are only deep recesses opening into a garden; a richly coloured curtain is suspended over the front by ropes like an awning when the room is used. In the neighbourhood of that city are the royal country houses, called Takht i Kujeriah, and Nigahristan. The medresseh of Hussein shah, the last of the Sufi kings of Persia, 1694-1722, is also a fine work. From the time of the Afghan invasion, Persia does not seem to have recovered herself to undertake very great works. A chief class of edifice is the BAZAAR: the one at Shiraz is an arched arcade with skylights, and nearly half a mile long, and perhaps 40 ft. wide; built of yellow brick. That at Lar in Laristan is the noblest in Persia, built like the above, but on a grander scale. Another class is the CARAVANSERAI; at Kerman are nine large ones within the walls, and a number of inferior ones both within and without. At *Maragha* in Azerbijan are the ruins of the observatory of the astronomer Nasireddin (1200-73) erected under the auspices of Hulaku. *Koom*, a large place, but almost entirely in ruins, is noted as a place of pilgrimage. Among the shrines, that of Fatima, the sister of Ali Reza, the eighth iman, is the most celebrated. Her tomb is in the centre of a lofty mosque adorned with mosaic work in coloured tiles, and fitted up with rich carpets; the dome is covered with gilt tiles. The tomb of the first shah, Sefi, is a series of towering vaults; the second, Abbas, has peculiar roof lights, and walls of mosaic work.

Among the connections which Colbert endeavoured to establish between France and Turkey, the Persian shawls were one of the products which he desired to obtain with ease; but these needed to be commissioned, and for fear that the barbarians might not be able to supply patterns good enough for the court of the "Grand monarque", he forwarded patterns, and Colbert's acanthus leaf, misunderstood or translated by the Persian weaver, has furnished the present age with the pine pattern for shawls, chintzes, paperhangings, etc. OWEN JONES, *Grammar of Ornament*, fol., Lond., 1856, gives, pl. 12, 13, Painted ornaments from Nineveh; pl. 14, Carved ornaments from Persepolis; and Sassanian ornaments from Ispahan and Bi-Sutoun; and pl. 44-6, Ornaments from Persian MSS in the British Museum. RACINET, *Polychromatic Ornament*, fol., Paris, 1873, gives plates of printed linen, engravings in niello, earthenware, tapestry and running ornament, decorations of manuscripts, and carpets. The glass manufactories at Shiraz are very extensive.

FLANDIN et COSTE, *Voyage en Perse*, fol., Paris, 1844; Domestic architecture, text, i, 113; ii, 55; 285; 345-54; 376: TEXIER, *L'Arménie, La Perse*, etc., fol., Paris, 1842-52: and COSTE, *Perse Moderne*, fol., Paris, 1867. These are architectural publications.

DIODORUS SICULUS, *Bibliotheca historica*. QUINTUS CURTIUS, *Alexandri Magni*. CHARDIN, *Voyage en Perse*, etc., 4to., Amst., 1735; by LANGLÈS, 10 vols., 8vo., Paris, 1811. NIEBUHR, *Reise nach Arabien*, 4to., Copenh., 1774-78. MORIER, *Two Journeys through Persia, Armenia, etc.*, 1808-16, 4to., 1812-18. OUSELEY, *Travels in* 1810-12, 4to., 1819-23. DROUVILLE, *Voyage en Perse* 1812-3, 4to., and 60 pl. fol., S. Petersb., 1819-20. HOECK, *Veteris Mediæ, etc., monumentis*, 4to., Gott., 1817-8. MALCOLM, *History of Persia*, 2 vols., 4to., 1815. KER PORTER, *Travels*, 4to., 1821-2. PRICE, *Journal of the Embassy to Persia*, fol., 80 pl., 1823. M(IGNAN), *Persia*, 8vo., 1828. BUCKINGHAM, *Travels*, 8vo., 1830. MIRKHOND, *Early Kings of Persia, from Kaiomars, the first of the Peshdádian Dynasty to the Conquest of Irán by Alexander the Great*; from the Persian by D. Shea, 8vo., 1832. FRASER, *Historical, etc., Account of P.*, 12mo., Edinb., 1834. FREEMAN, *History of Architecture*, 8vo., 1849, p. 85-94. LAYARD, *Discoveries*, 8vo., 1853; p. 32-3; 571. RAWLINSON, *The Five Great Monarchies of the Ancient Eastern World*, 4 vols., 8vo., 1862-66: 2nd edit., 1871. PIGGOT, *Persia, Ancient and Modern*, 8vo., 1874. VAUX, *Ancient History—Persia from Monuments*, 8vo., Oxford, 1875. COSTE, *Souvenirs de Voyages*, 8vo., Marseille, 1878. *Dwellings of Workpeople*, in BUILDER *Journal*, 1875, xxxiii, 367. 25. 96.

PERSIAN PORTICO. See PERSÆ.

PERSIAN RED. Another name for INDIAN RED.

PERSIENNE. The French term for a wooden lathed outside shutter; see JALOUSIE. The details of its formation are given in MANDAR, *Etudes d'Arch.*, fol., Paris, 1826, pl. 107. A new system for folding the shutters *in* the outside reveals, is shown in DALY, *Revue Générale*, 1849, viii, 327, pl. 32. 25.

PERSIGLIANO MARBLE. The quarries are on the road from Turin to Oneglia. 28.

PERSIUS (.....), was employed by Frederick William IV, king of Prussia (1840-61), in a great variety of works at Potsdam, such as villas, garden temples, and other ornamental structures in a diversity of styles. His design for the Krollschewintergarten (Italian) at Berlin was carried out 1843-44 by Knoblauch, who designed the king's saloon (it was gutted by fire Feb. 1851); ALLGEMEINE BAUZEITUNG, 1846, pl. 54; ARCHITECT, ETC., *Journal*, ii, 268. The church at Sacrow, near Potsdam (Byzantine) 1842-3; ALLG. BAUZ., 1845, pl. 688-9; CIVIL ENGINEER, ETC., *Journal*, 1846, ix, 161. Babelsberg, designed by Schinkel, was probably carried out by Persius; whose church at Sans Souci, and many works at Potsdam, are illustrated in several plates in the ALLG. BAUZ., for 1843-46. He published *Entwurfe zum Umbau vorhandener Gebäude;* and *Bau ausfuhrungen in Schloss Park zu Glienike bei Potsdam*, 6 pl., fol., Pots., 1843: and died 12 July 1845 (not June 28, as sometimes stated); CIVIL ENGINEER, ETC., *Journal*, 1845, viii, 348: ix, 161.

PERSONA; sometimes called ANTEFIXUM. The check or stop to the covering or joint tiles to the roof of a temple, appearing at the cymatium or corona of the cornice. HARMOS, and IMBREX, where its positions are defined. PLINY, xxxv, 43, says of Dibutades, "Primusque personas tegularum extremis imbriaibus imposuit", etc. An "imbrex of the old style", finished with a human bust, is given in BIRCH, *History of Ancient Pottery*, 2nd edit., 8vo., Lond., 1873. TEXIER, *Des Tuiles Ornées appelées Antéfixes*, in DALY, *Revue Gén.*, 1858, xvi, 159; and two coloured terra cotta examples from the museum at Perugia, xv, pl. 28, and xvii, pl. 1. JENKINS and HOSKING, *Architectural Ornament*, fol., Lond., 1827, pl. 11 and 16, give several examples. INWOOD, *Erechtheion*, fol., 1827. VIOLLET-LE-DUC, *Dict.*, s. v. Tuile, p. 324, gives an illustration of an early mediæval example finishing the hip tiles at the church of Ste. Madeleine at Béziers.

PERSOONS (KLAAS JEREMIAS). He restored to the upright the lofty tower of the Laurentius church at Rotterdam, which in 1651 inclined 3½ ft.; and the foundations were renewed without accident. He designed several private houses. SPAAN, *History*. LOIS, *Chronicles of R.* 24.

PERSPECTIVE or PERSPECTIVE DRAWING. The art of representing solid bodies by means of pictures drawn upon a surface so as from a certain position to affect the eye in the same manner as would the object themselves. The surface is usually, though not necessarily, flat, and is most commonly placed

upright; ENCYCLOPÆDIA BRITANNICA. AERIAL; ANGULAR; BIRD'S EYE; ISOMETRICAL; LINEAR; and PARALLEL, perspective. ICHNOGRAPHY. ORTHOGRAPHY. PROJECTION. SCENOGRAPHY. STEREOGRAPHY.

The first edition of the first work on true perspective is by Jean Pélerin, fol., Toul., 1505; reprinted, Toul., 1509: reprint by Jousse, 1635; it was reproduced in *fac simile*, fol., Paris, 1861. *Notes on the History of Perspective* from anterior to Parrhasius and Zeuxis down to Brook Taylor who died 1731, by prof. DE MORGAN, are given in ATHENÆUM, 1861, p. 446, et seq.; and 1863, p. 812. ELMES, *Dict. of the Fine Arts*, 8vo., 1826, gives a long list of writers on Optics and later Perspective. SIRIGATTI, *La Pratica di Prospettiva*, fol., Ven., 1596; 1625. POZZO, *Perspectiva pictorum et architectorum*, fol., Rome, 1693-1700; 1723-37; transl. by J. James, fol., Lond., n.d.; transl. by R. Pricke and E. Chambers, fol., 1726: *Jesuit's Practice of P.*, by Bowles, 4to., 1782. KIRBY, *Dr. Brook Taylor's P. made easy*, 4to., 1754. BROOK TAYLOR, *Principles of the Practice of the P. of Architecture*, 4to., 1761; 1763. MALTON, *Treatise on P., in Theory and Practice, on the Principles of Dr. Brook Taylor*, fol., Lond., 1779; 1776-83. MALTON, *Young Painter's Maulstick; a practical treatise on P., on the process of Vignola and Sirigatti, and the principles of Dr. Brook Taylor*, 4to., 1800. NICHOLSON, *Arch. Dictionary*, 4to., Lond., 1835. PARSEY, *Persp. Rectified*, 4to., 1836. MOORE (G. B.), *P., its principle and practice*, 8vo., 1850. GWILT, in *Encyc. of Architecture*, 8vo., 1842; 1876. BURCHETT, *Practical Persp.*, 8vo., 1856; and his *Linear P., for the Use of Schools of Art*, 8vo., 1865. DENNIS, *Third Grade P.*, 8vo., [1876]; and *Second Grade P.*, 8vo., 1878. 6. 14.

MORRIS, perspective scheme for working on the board with proportions after the extreme lines have been obtained; BUILDING NEWS *Journal*, 1863, p. 764. *Proportional Scales*, in BUILDER *Journal*, 1849, vii, 256.

INSTRUMENTS *for drawing in perspective.* Turrell's perspectograph, described in SOCIETY OF ARTS, ETC., *Transactions*, xxxii; Farey's ditto, in xxxii; Allason's, xxxiv, p. 144. EUROPEAN MAGAZINE, 1782, ii, 89; and 377, by J. Priestley, of Bradford, Yorks. Watts's, in BUILDER *Journal*, xiii, 38. LOUDON, *Arch. Mag.*, ii, 459. CENTROLINEAD. A Bicentrolinead was brought forward in 1872.

PERSPECTIVE ARCHITECTURE. See FICTITIOUS ARCHITECTURE. OPTICAL CORRECTION (p. 18).

PERSPECTIVE; ARITHMETICAL, *in which the representation is obtained by computation*, by G. BERNARD, 8vo., 1839.

PERSPECTIVE; CURVILINEAR: is described by HERDMAN, *The Curv. Persp. of Nature and its Applicability to Art*, 8vo., Lond., 1853.

PERTH (Roman Orrea and Ad Taum or Tavum in its vicinity). The capital of the county of the same name in Scotland; down to the death of king James I, in 1437, it was regarded as the capital of Scotland. Over the river Tay is a stone bridge, designed 1768-70 by John Smeaton, about 900 ft. long and 22 ft. wide. Overhanging iron footways have lately been added. The previous bridge, built 1599-1616 by John Mylne and his son, was destroyed 1621; the market cross 1668 by Robert Mylne, was sold 1765. The church of S. John is chiefly of the Decorated period. The S. Andrew's church, schools, and parsonage 1869 are by J. Peacock of London; (BUILDER *Journal*, xxvii, 249). Of S. Ninian's Episcopal cathedral, the choir and transepts were designed 1849-51 by W. Butterfield; (HOPE, *English Cathedrals*, 8vo., Lond., 1861, p. 78: ECCLESIOLOGIST *Journal*, 1850, xi, 200). The county hall, etc. (Grecian), is by Sir R. Smirke. The Central bank of Scotland 1848 is by D. Rhind. The old gaol has an octagonal tower supposed to have been built by Thomas of Cochrane, mason, created earl of Mar (died 1482). "Marshall's monument" contains the public library and a museum. Scone palace, near the city, has nearly been rebuilt. About nine miles distant, at Glenalmond, is Trinity college episcopal seminary, 1843-48 by J. Henderson; BUILDER *Journal*, i, 478. *Guide to the City and County*, 14 pl., 8vo., 1822; 1851: PERTHSHIRE ILLUSTRATED, 4to., 1843. PERTH, in BUILDER *Journal*, 1865, xxiii. MAITLAND CLUB, *Chronicle of Perth*, 4to., 1831. 14. 28. 50.

PERTUSA; see CARDONA Y PERTUSA (J.) 66.

PERU; ARCHITECTURE OF. "There are evidences in Peru of an early and comparatively rude past. Combined with the stupendous and elaborate remains of Tiahuanuco (the Baalbec of the New World)—remains as elaborate and admirable as those of Assyria, of Egypt, Greece, or Rome—there are others that are almost exact counterparts of those of Stonehenge and of Carnac in Brittany, as the sun circles of SILLUSTANI—these monuments are old, very old;—there is no valid evidence that within any period known to human records the progenitors of the Peruvians reached their country from abroad, or that their civilisation was imparted to them by any other race"; SQUIER, *Incidents of Travel, etc., in the Land of the Incas*, 300 illust., 8vo., Lond., 1877, p. 575-6. Less artistic than the antiquities of Mexico, but more vast and massive, are the structures in Peru, which have been as yet imperfectly explored. They are characterised by simplicity and solidity; no columns or pilasters or arches, and no exterior ornamentation. The rudest of the works are sepulchral, and resemble the cromlechs and stone circles of other countries. The *chulpa* or burial tower is square or round, built of stones, increases in width towards the top, and is domed over; a few are of two stories; and lined inside with a stucco, still in good preservation. Some sepulchral mounds exist, sustained by huge retaining walls; none seem as yet to have been explored. The most interesting remains are called *huaca*, but whether they were forts, palaces, or tombs is uncertain. They were enclosed by walls about 15 ft. thick, and divided by cross walls, forming chambers which were stuccoed; remains of staircases exist. Sun-dried bricks or *adobes*, about two-thirds the size of the English brick, or *adobines*, about 3 to 6 ft. long, were used; LEWIS, *Architecture*, p. 451-2, in ENCYC. BRITT, 9th edit. At Pachacamac (now LURIN) are numerous buildings built of *adobes;* several large rectangular mounds and a temple erected by the Chimus, who were conquered by the Incas about a century before the conquest by the Spaniards in 1533; BUILDER *Journal*, 1876, xxxiv, 569. TITICACA; CUZCO; other places are Truxillo; Moche; Grand Chimu; Tacna; Coati island; Ollantaytambo; Pisac; Cajamarca; etc. HUMBOLDT, *Vues des Cordillères*, etc., fol., Paris, 1810-13, obtained an ancient Peruvian cutting tool, found not far from CUZCO: it consisted of 94 parts of copper and 6 of tin, and was nearly as hard as steel; such no doubt were used in forming stones 40 ft. long, 20 ft. wide, and nearly 7 ft. thick, fitted together with great skill, with a thin cement or bitumen. The sides of the doors approach each other at top. 14. 50.

RANKING, *Historical Researches of the Wars and Sports of the Mongols and Romans*, etc., 4to., Lond., 1826; and *On the Conquest of Peru, etc., in the 13th Century by the Mongols*, 8vo., Lond., 1827-34, with its review in QUARTERLY JOURNAL of Literature, etc. (known as *Brande's Journal*), Jan. 1827, p. 247. P. de CIEZA, *Seventeen Years' Travels through Peru*, transl. from the Spanish by J. Stevens, 4to., Lond., 1709. PRESCOTT, *History of the Conquest of Peru*, 8vo., 1853. TSCHUDI by ROSS, 8vo., Lond., 1847, p. 258; 384; 496-9; baths 239; tombs 502, and gives a chronology, p. 45. RIVERO and TSCHUDI, *Antiguedades Peruanas*, 58 pl., 4to., Vienna, 1851; transl. by HAWKS, 8vo., New York, 1853. NORMAN, *Rambles in Yucatan*, 8vo., New York, 1843, p. 289. HILL, *Travels in Peru and Mexico*, 8vo., Lond., 1846. SQUIER, *Observations on the Geog. and Archæology of Peru*, 8vo., Lond., 1870: and his *Primeval Monuments of Peru*, 8vo., New York, 1870. TEMPLE, *Travels in Peru, including—Potosi*, 8vo., 1830. MARKHAM, *Peru and India*, 8vo., 1862. HUTCHINSON, *Two years in Peru*, 8vo., 1873.

PERUGIA (the anc. *Perusia, Perosche* of the Etruscans; Fr. *Pérouse*). The capital of the province of Umbria, in Central Italy. It was burnt B.C. 40, rebuilt by emperor Augustus; and 251-4 became the colonia Vibia in honour of emperor V. T.

Gallus. It is much doubted whether the walls belong to the Etruscan city or are of later times. The chief Etruscan remains are the sepulchres (discovered 1840); that of the Volumnii (supposed VI cent. of Rome, and consists of ten chambers) has been preserved as when first discovered. Another is remarkable for the careful construction and regular masonry of its arched vault: Vermiglioli, *Iscrizioni Perugine*, 4to., Per., 1834; and *Il sepolcro dei Volumni*, 4to., Per., 1841. Smith, *Dict. of Geog.* The arch of Augustus is given in *Illustrations*, s. v. Entrance Gate; Chabat, *Fragments d'Arch.*, 4to., Paris, 1877; and in Daly, *Revue Générale*, 1856, pl. 35-6; who, pl. 37, gives the porta Marzia removed by A. (Giamberti) da San Gallo, and rebuilt in the walls of the citadel erected by him. Conestabile, *Dei Monumenti di Perugia Etrusca e Romana*, fol., Per., 1855-70. Dennis, *Etruria*, 8vo., Lond., 1848; 2nd edit. 1879.

The bridge called ponte nuovo, across the river Tiber, dates *circ.* 1322, by fra Bevignate. The bishopric was founded 57. The duomo, dedicated to S. Lorenzo martire, dating 1339-45, is by fra Bevignate, and was modernised about 1851. The aile vaultings spring at the same height as that of the nave; and the ailes have (or had) two ranges of windows; the pulpit is attributed to G. da Pisa; the third chapel on the south side is by G. Alessi; the entrance porch is by the sculptor Scalza; (Galassi, *Descr. della Basilica*, Ven., 1776). There are upwards of one hundred churches and oratories, of these the following are most noticeable. *Sta. Agata* (Pointed), desecrated, has a fine west door, with pedimental portal. *S. Agostino* (Renaissance); the tarsia work of the choir seats are by Baccio d'Agnolo, from designs by Perugino. *S. Angelo*, probably rebuilt V or VI cent., is circular, with sixteen monolithic granite and marble columns; the doorway dates in XIV cent. The church was restored 1803; (Orsini, *Sull' antico tempio di S. Angelo*, 12mo., Per., 1792; Hubsch, *Altchristl.*, fol., 1858, pl. 42). Confraternità de *SS. Andrea e Bernardino*, also called *dei Nobili* della Guistizia, has a façade 1461, with coloured terra cotta ornamentation, by A. Duccio (della Robbia); it is called *S. Francesco de Nobili*, in Gailhabaud, *Monumens*, 4to., Paris, 1850, iv and plates. *S. Domenico*, built 1304 by G. da Pisa, who executed the fine tomb of Benedict XI (died 1304) given in Cicognara, *Scultura*; the west end is preserved, its lancet light has stained glass 1411 by fra Bartolommeo of Perugia; "the east window is perhaps the finest in Italy" (Webb). The church, which has only a nave with a continued vault uninterrupted even by a window (remarked upon by Woods, *Letters*, 1828, ii, 105), was designed 1624-32 by C. Maderno: (Boarini, and by Orlandi, *Descr. Storica*, etc., 4to., Per., 1778; and 1788). *S. Ercolano*, founded 1297; rebuilt 1325-35 by fra Bevignate, is octagonal, with a chancel; the interior is modernised. *S. Francesco dei Conventuali*, originally Pointed; the stalls are placed behind the altar; it was remodelled 1737; (Modestini, *Descr. della Chiesa*, Per., 1787; perhaps Woods, p. 105). The fine cloister of *Sta. Giuliana*, 1292, outside the city, has a good cistern. *Madonna di Monte Luce*, (transition to Italian) is by G. Dante; the façade of checkered work has a large round window of seven smaller circles; *Sta. Maria nuovo* (late Pointed) is modernised. *S. Pietro dei Cassinesi*, Benedictine; a basilican church with 18 antique monolithic Ionic columns of Sardinian rose-coloured granite, and grey marbles; the stalls are by S. da Bergamo, from designs by Raffaello; the tarsia work by D. da Bergamo (Architect *Journal*, 1849, i, 448; Galassi, *Descr. delle pitture di S. Pietro di Perugia*, 1774; *Ornati d'invenzione di Raffaele—di S. Pietro*, fol., Rome, 1811; 1845; and *Gli ornati del coro, etc., Rome*, 1845); the majolica floor in the sacristy was made at La Diruta, near Urbino. *S. Stefano* (early Pointed) desecrated, has a fine west door of the Perugian type (Webb). P. Baglioni (died 1703) designed the churches of the padri Filippini, and of the padri S. Bernardino. C. Murena, *circ.* 1752, designed the church and monastery of the Olivetan monks of Monte Morcino.

The tribunal del circondario was formerly the palazzo of the capitano del popolo, 1371 (Italian Gothic). The tribunale di apello was the former collegio Pio or university: which, founded 1320, now occupies the former Benedictine monastery of the Olivetines; it also contains the museums and works of art. The palazzo Florenvi is by Barozzi. The palazzo dei priori or palazzo comunale or del governo, 1281 but supposed 1333 (Italian Gothic), is by fra Bevignate, or G. da Gubbio (who also designed 1371 the fortress of porta Sole): some of the rooms are by G. Alessi. The collegio or sala del Cambio has the interior vaulting dated 1453, and covered with frescoes by P. Perugino, finished 1500, the master of Raffaello; these arabesques are therefore noticeable as painted long before those by the pupil at the Vatican. Perugino's palace wherein he died 1524; and that of Castilione on the lake for the duca del Corgna by G. Alessi, are noticeable. The aqueduct 1322 is stated to be by fra Bevignate. The fountain in the piazza near the duomo, 1277-80, is by Guido, a Silvestrine monk, who conveyed the water from monte Paciano, two miles distant: the sculptures of the polygonal or lower basin are by N. and G. da Pisa; the third or bronze basin, 1277, by maestro Rosso; the sculptures were restored by V. Danti, brother of fra Ignazio (Marchese, *Lives*, ii, 301). Gally Knight, *Ecclesiastical Architecture*, fol., 1844, gives the piazza, etc. Verdier et Cattois, *Arch. Civile*, 4to., Paris, 1857, ii, with the sculptures. A bronze seated statue 1555 of Julius III is by V. Danti.

The *Illustrations*, s. v. Bell gable; Corbel; Ecclesiastical Sculpture; Tomb; Entrance Gate. *Perugian glass painting*, in Builder *Journal*, 1875, xxix, 363. Vermiglioli, *Biblioteca Storica Perugina*, 4to., Per., 1823; and his *Memorie della Zecca*, etc., 8vo., 1816; who with Bianchini has illustrated the antiquities, Etruscan and Roman. Passeri, *Vite dei Pitt., Scul., ed Archit. Perug.*, 4to., 1723. Mariotti and Morelli, *Pitture e Sculture*, etc., 1683. Ciatti, *Memorie di Per.* Orsini, *Guidà*, 8vo., Per., 1784. Mariotti, *Saggio di Memorie Istoriche della Città di Per.* Williams, *Travels in Italy, etc.*, 8vo., Edinb., 1820. Siepi, *Descr. top. istor. della citta*, 1821. Bartoli, *Perugia*, 8vo., Per., 1843. Gambini, *Guida*, n. d. Webb, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 445-54, describes all the churches named herein. 28. 96. 12. 14

The lofty campanile of the palazzo Doria, near Perugia, once a preceptory of the Templars, dates early in the XIV century. Monte Corona, a Camaldolese monastery, twelve miles north of Perugia, is in good order; Premuda, *La Istoria Romoaldina*, etc., Venice, 1590. The church of Madonna degli Angeli, 1569, is noticed s. v. Assisi, Alessi, and Barozzi.

PERUGINI (Galeazzo), better known as Alessi (G.).

PERUSIA. The ancient name of Perugia.

PERUVIAN ARCHITECTURE; see Peru.

PERUVIAN WOOD. A fine sound wood so called, about 12 ins. to 16 ins. diameter; of the rose-wood character, but harder, closer, and lighter in colour; and has a straighter distribution of dark red-brown and black veins. Its true name and locality are unknown: Holtzapffel, *Cat. of Woods*, 8vo., Lond., 1843.

PERUZZI (Baldassare), "Baldasse Perutio de Siena", in a letter 1528 from himself, in Gaye, ii, 171; also Petrucci, in Serlio, *Architettura*, 1663, p. 118; and by Lomazzo; Baldassare da Siena, Baldassare Sanese (G. di), and Balthazar Senensis (J. de). He was born 1481 at Accajano near Siena (Volterra is usually stated), learnt painting and went to Rome, where he executed a large number of architectural representations; and with Bramante the ospedale degli Eretici Convertiti, formerly palazzo Spinola, and degli Eretici Ravveduti, near the piazza of S. Peter's. Removing to Bologna, he made 1520 some designs for the façade of S. Petronio, which with others still exist in the vestry of that cathedral, though Vasari, iv, 55, states they were lost; (Donaldson, in Roy. Inst. of British Archts., *Sessional Papers*, 1870-71, p. 43-4). He designed the portal to the church of S. Michele in bosco outside the town; and embellished the monastery, now suppressed, of the Olivetines (Mal-

VASIUS, *Pitture*, 12mo., Bolog., 1766, p. 382, 420; 275; DONALDSON, *Modern Doorways*, 4to., Lond., 1836, pl. 21-3): and designed the palazzo Albergati, but the date 1540 is also assigned to it. At Carpi he designed, *cir.* 1520-3, the duomo carried out by A. Federzoni. At Ferrara, the palazzo Castelli, afterwards Sacrati de' Leoni, now Prosperi, is ascribed to him, (or only the portal), attributed also to Barozzi (the mistake may arise from there being another palazzo Sacrata, now Strozzi). He fortified, *cir.* 1520, the city of Siena: and then returning to Rome, he was employed by pope Leo X (1513-22) in the building of S. Peter's, who, thinking that the idea of Bramante (given in SERLIO, p. 116; 118) was too vast, Baldassare 1520-22 made a new model, showing a Greek cross with a central dome 138 ft. diameter. Bramante retained the old choir, and put a screen of peperino stone, which was finished by Peruzzi and removed by Bernini (FONTANA, *Il tempio Vat.*, fol., Rome, 1694). Peruzzi completed the south transept, commonly called la cappella del rè di Francia (VASARI, ii, 439). He made a design with others for the church of S. Giovanni de' Fiorentino, but one by J. Tatti Sansovino was preferred (LETAROUILLY, 541). He designed the tomb of pope Adrian VI (died 1523), carved by M. Angelo Sanese and N. Tribolo, in the choir of Sta. Maria dell' Anima, the doorways in the façade of which church are attributed to Peruzzi, but the front is considered to be by A. Giamberti (LET., p. 210-1, pl. 68): 1510-24 the palazzo alla Lungara for Agostino (Ghigi now) Chigi, and now called La Farnesina (dated 1518 in FERRERIO, *Palazzi* (1655), pl. 10; LET. p. 240; pl. 100-2; GRUNER, *Fresco Decorations*, fol., Lond., 1844, pl. 16-18, and text by HITTORFF, p. 22); the architectural paintings in the upper hall are by Peruzzi himself; also the loggia or casino in the gardens, also with paintings by him: and the capella Ghigi (second on right hand) in the church of Sta. Maria del Popolo (LET., p. 237 and 522; pl. 97 and 238; not by Raffaello). The palazzo Lante, begun 1513 in the piazza de' Caprettari for Giuliano de' Medici by his brother cardinal Giovanni afterwards Leo X, was designed, not by Peruzzi as stated in LET., p. 133, but by Bramante (p. 346, pl. 153-6), and completed by J. (Tatti) Sansovino (according to MELCHIORRI, *Guida*, Rome, p. 584).

Peruzzi painted two scenes for a comedy by cardinal Bibiena played before the pope; directed the preparations for the coronation of Clement VII (1523-34): and did the paintings in the vestibule of a house in via di Parione (or they are by Giov. da Udine; LET., p. 195; pl. 55). At the sacking of Rome 1527 by the Spaniards, he became a prisoner, but escaping he reached Siena; where he executed the oratorio della Selva; the doorway of S. Spirito; a marble seat in the casino de' nobili; the palazzo Pollini; the steeple and cloisters of the Carmine; the church of the Concezione for the Servites; the high altar with the chapel of S. John the Baptist in the cathedral; a façade to a house in the rue del Corso (GRANDJEAN et FAMIN, *Arch. Toscane*, fol., Paris, 1806, pl. 99); and the villa Belcarro near the city; some of his drawings still remain in the library of the university. At Ferrara he designed the fine portal to the Sacrati palace.

On his return to Rome he designed two palaces on the road to Viterbo for the Orsini family; some buildings to be constructed in Apuglia; a small palace in the via Giulia having much external decoration (LET., p. 704; pl. 344): the cortile of the palazzo Altemps, piazza Fiammetta, is ascribed to him, but finished by M. Lunghi, sen. (FERRERIO, *Palazzi* (1655), pl. 61-2; LET., p. 368, pl. 169-70, with p. 133, the conjectural date 1570): from 1532 the large and exquisite work (begun 1526, *Handbook*) of the palazzo Massimi alle Valle, having an irregular façade. These palazzi for Pietro and Angelo Massimi he combined with the old one in the piazza della Posta vecchia in the rear. SERLIO (p. 123-5) mentions that his master made out the plan of the theatre of Marcellus, of which part was found on the site (VASARI, ii, 433; LET., 571-3; pl. 280, and 24 plates; FERRERIO, pl. 32; SUYS et HAUDEBOURT, *Les deux palazzi Massimi*, 43 pl., fol., Paris, 1818; 1839). Peruzzi designed the vigna of pope Giulio III (1550-55) in the via Flaminia, also ascribed to Sansovino by VASARI: the capella di S. Andrea or its basement (LET., 421, 435; pl. 199 and 212, etc.): the palazzo Ossoli, via de' Balestrari, and a palazzo in the piazza de Satiri are attributed to him by LET., 203, pl. 61-2; and 171, pl. 31): strengthened the cortile di S. Damaso in the Vatican (LET., 132) by an addition to the arches of the Doric order; but the design seems to have been by Bramante, and the execution of the western side by Raffaello (VASARI): and also with Bramante, the house for Raffaello in which he died; its later occupation is described s. v. Lazzari: he designed a façade in *terretta* between the Campo de' Fiori and piazza Giudea for one of the pope's chamberlains (VASARI); the casa Farnesina, afterwards the palazzo (Silvestri, in FERRERIO and FALDA, pl. 76-8, now) Linotte, in the vicolo dell' Aquila, near the Cancelleria (LET., p. 188; pl. 49); also ascribed to Bramante about 1534; or else to A. Picconi, or to A. (Giamberti) San Gallo, rather than to Buonarroti: and the casa (for Jacobus Brixianus, surgeon to Leo X, now) del Sr. Giuseppe Costa, via di Borgo Nuovo, near St. Peters (FALDA, pl. 89; and LET., p. 180, pl. 43).

Peruzzi died suddenly, in a state of misery, in 1536, aged 55 years; some early works state at the age of scarcely 36 years, and was buried in the Pantheon by the side of Raffaello; the inscription preserved in VASARI is no longer to be seen. He had two sons, Giovanni, and Onorio, a painter. G. B. Peloro, G. Meglighino, Fr. da Siena, A. Rozzo, Le Riccio and Vergile, were pupils, and S. Serlio, who used the collection of drawings left by his master, in his *Architettura*, fol., Ven., 1540; 1584 is the best edit.; he gives a doorway (p. 267-8 of the edit. 1663); and refers to a hall in a house for A. Chigi, p. 354-6. T. Pelegret of Toledo, and G. Philandrier of Rodez in France, studied under him. 3. 14. 25. 28. 30. 62. 105. 112. 113.

NELLI, *Discorsi di Architettura, con la vita del B. S. Peruzzi, e con ragionamenti sopra le cupola di Cecchini, Archt.*, 4to., Flor., 1753. MATAS, *Elogio di B. Peruzzi*, 8vo., Pisa, 1850. ROSSINI, *I Monumenti di Roma*, fol., Rome, [1818], pl. 38; 42; 43, gives the courts of pal. Massimi, pal. Silvestri, and in strada Giulia. Q. DE QUINCY, *Vies des Arch.*, 8vo., Paris, 1830, i, 123, with plate of a house near the palazzo Spada; and the palazzo Massimi. *Lettere Sanesi*, iii, 178. *Dissertazioni Anconitane*, i, 4to., Bolog., 1818. WARING, *On Peruzzi*, in BUILDING NEWS *Journal*, 1872, xxii, 110. FEA, *Notizie intorno Raf. Sanzio*, etc., 8vo., 1822. VASARI, *Lives*, 8vo., Lond., 1851, iii, 157-73. GAYE, *Carteggio*, 8vo., Fir., 1840, ii. ANGELL, *Life and Works of B. Peruzzi*, read at the Inst. of Brit. Architects, 4 April 1859, and printed in *Sessional Papers*; and in BUILDER *Journal*, xvii, 309. GIANGIACOMO, *Apside della Chiesa di S. Onofrio*, fol., Rome, n. d., an early decorative work at Rome. PERCIER et FONTAINE, *Edifices Modernes de Rome*, fol., Paris, 1830, pl. 2, 4, 22, 28, 57-61, and 89, illustrate several of Peruzzi's designs. DONALDSON, *Modern Doorways*, 4to., London, 1836, p. 6, pl. 19-23, from pal. Massimi and chiesa S. Michele in Bosco at Bologna.

PERUZZI (GIOVANNI, called SALUSTIO in VASARI and MILIZIA), son of Balthazar; designed for pope Paul IV (1555-60) the great gate of the castello S. Angelo at Rome (VASARI, *Lives*, v, 173; 311); and the church Sta. Maria Transpontina S. Angelo, in the regione di Borgo; (ROSSI, *Nuovo Splendore*, fol., Rome, 1688, part 3, pl. 31; RUBEIS, *Insignium Romæ Templorum*, fol., Rome, 1684, pl. 65); the façade was added by O. Mascherino. The design of the church is also attributed to F. PAPARELLI.

PERUZZI (G.), restored 1464-70 the cathedral dedicated to S. Paolo at Macerata: it was rebuilt by C. Morelli at the end of the XVIII century: the bell tower was erected 1478.

PESARO (the ancient Pisaurum). A town in central Italy. Brunellesco made a model for the fortress: and Pier Francesco 1512 advised thereon, but the design is chiefly attributed to G. Genga: and Lapi, *cir.* 1425, made a model for the fortifications of the harbour. It is the see of a bishop. The cathedral, dedi-

cated to the Assumption of the Virgin, is old but of no interest. S. Giovanni de' Riformati was designed by G. Genga (1476-1551); who also, *cir.* 1540, designed S. Giovanni Battista, for duke Guidobaldo, which was carried out by his son B. Genga (1518-58). A design for the church della Maddelena was made by L. Vanvitelli. The tomb in Sta. Chiara of the duke F. Maria, is by G. Genga, carved by B. Ammanato. The palace of the dukes of Urbino is ancient; the court, etc., was restored by G. Genga for F. Maria, duke III, and the suite of apartments in the court next the merchants' street was by B. Genga. The large building opposite, now shops, was occupied by the pages of the court; a plan of an entrance, perhaps belonging to one of these edifices, is given in LECLÈRE, *Recueil d'Arch.*, fol., Paris, 1826, pl. 21. There is a marble statue of pope Urban VIII. The villa imperiale on the side of monte S. Bartolo, outside Pesaro, was built about 1511 by Bramante (died 1514) for Eleonara Gonzaga, wife of duke Francesco Maria. VASARI attributes this villa to G. Genga; and (edit. 1851, v, 402) says Genga added a tower 120 ft. high, and painted some decorations to the old palace; they were near each other on the same hill. BRAMANTE. The manufacture of pottery, which existed at Pesaro from the time of the Roman emperors, was revived 1300, and in the middle of XVII century; there is a good collection of majolica in the museum. 12. 28. 50. 96.

BUONAMICI, *Architettura delle fabbriche fatte sul porte di P.*, Bologna, 1754. ABATI, OLIVIERI-GIORDANI, *Della Fondazione di Pesaro*, 4to., Pes., 1757; *Memorie per la storia della Chiesa Pesarese nel secolo XIII*, 4to., Pes., 1779; *Di alcune antichità Cristiane, etc.*, 4to., Pes., 1781; and 1784; *Memorie del Porto di Pes.*; and other works.

PESHAWUR. The capital of the territory of the same name, in Afghanistan, and now incorporated with the Punjab. The once numerous and fine mosques are decaying. FERGUSSON, *Indian, etc., Architecture*, 8vo., Lond., 1876, p. 169-84, notices the recent, 1848-51, excavations of the Gandhara monasteries at Jamalgiri, Takht-i-Bahi, and Shah Dehri, situated 36 miles north-east. Capitals of a Corinthian type, coloured and gilt, perhaps Byzantine, are found in great numbers; and an Ionic capital at Shah Dehri. He writes: "The extraordinary classical character and the beauty of the sculptures found in these Gandhara monasteries is of surpassing interest for the history of Indian art". It is at present assumed that they date B.C. 40, and extend to A.D. 100 or thereabouts; and formed by the Bactrian Greeks carrying with them into Asia the principles and the forms of Greek architecture. He also states that the small detached rath at Mahavellipore reproduces them with considerable exactness, being an exact copy of what a Buddhist chaitya hall was at the time it was carved.

PEST (Bohemian *Pec*, pronounced *pets*, an oven; translated Ger. OFEN as applied to BUDA on the opposite side of the river; Engl. PESTH). A city in Hungary, situated on the river Danube, here crossed by a suspension bridge, as s. v. OFEN. The city was possessed by the Turks from 1526 to 1686. Among the best edifices are the old *stadtpfarrkirche* (Gothic), dedicated to the Assumption of the Virgin; the Leopold R. C. church 1855 by Hild and Ybl; the dome fell 1868, (Roy. Inst. Brit. Archts., *Sessional Papers*, 1867-68, p. 239); the Protestant church 1799-1805; the synagogue (Moresque) 1858; the university church of S. Paul 1698-1776; the temporary *landhaus* (Renaissance), 1866, by Ybl; the national museum, founded 1802 (Renaissance), the largest edifice in the city, *cir.* 1835-40, by Michel Pollak; the *rath haus* 1844 by Hild and Kasselik; new exchange; post office; savings bank; national academy of science 1860-64, by Stüler of Berlin; the statues of terra cotta by Berlin artists; (elevation in BUILDER *Journal*, 1876, xxxiv, 811): *redoutengebaüde* 1832, by M. Pollak; Ludoviceum or military academy 1830-38; *invaliden* hospital having four large courts, begun 1727 by A. Martinelli, for Karl VI; the immense *neugebaüde*, now (1873) barracks and artillery depôt, 1786, for Joseph II, but not completed; the theatre 1806-12 by J. Aman, holding 3,000 people; and *nemzeti* or Hungarian theatre 1837-38. Since 1867 the Hungarians have largely embellished this city. In the stadtwäldchen is the first wire suspension bridge, 72 ft. long and 6 ft. wide, erected in Hungary, 1826, by A. Fritz of Vienna. The very deep artesian well is noticed in BUILDING NEWS *Journal*, 1877, xxxiii, 605. 14. 26. 28. 50.

Elöädva 32 *eredeti*, etc. (good views), 4to., Pest, 1845. MARMIER, *Du Rhin, etc.*, 8vo., Paris, (1846). BEATTIE. *The Danube Illustrated*, 4to., Lond., 1844. QUIN, *Steam Voyage down the Danube*, 12mo., Lond., 1835. PENNY MAGAZINE, 1836, v, 437.

PESTAGALLI (PIETRO) succeeded May 1813 as *ingegnere* at the duomo at Milan, rebuilt 1817 the *scurolo* di S. Carlo, and completed the façade about 1848. In 1821 he completed the façade and designed the high altar of the church of S. Fedele; and 1823-5 the casa Cagnola, both in the same city. He died in 1853. FRANCHETTI, *Storia del duomo*, 4to., Milan, 1821, p. 129.

PEST HOUSE; see LAZAR HOUSE.

PESTO. The Italian name of Pœstum in Southern Italy; see POSEIDONIA.

PETEN; District of. The most northern part of Central America. GALINDO, *Account of some Antiquities*, comprising some tablets from Palenque, etc., in SOCIETY OF ANTIQUARIES, *Archæologia*, 4to., Lond., 1834.

PETER; see INGENARIUS: see PETRUS: see PIETRO.

PETER of Colechurch; see COLECHURCH (P. OF).

PETER von Weissenfels (meister); see FREIBURG. 92.

PETERBOROUGH (anc. Medeshamsted). The capital of Northamptonshire, situated on the river Nene, over which is a wrought iron girder bridge 1872, by J. Fowler, C.E.; BUILDING NEWS *Journal*, xxiii, 507; and a long viaduct of the Great Northern railway; BUILDER *Journal*, 1850, viii, 113. The town originated with the foundation of a Benedictine abbey, which was destroyed 870 by the Danes; restored 970, called Burgh or Gildenburgh, from its wealth, and Peter-burgh from the name of the saint to whom the edifice was dedicated. In 1116 the church was again burnt; the choir, presbytery, and eastern ailes of the transepts were built 1118-33, entered 1140 (LINCOLN, Alexander of): 1155-75 the east transepts and portion of the central tower, with the painted wood ceiling: 1177-94 the nave, west transepts, and the painted wood ceiling, transitional Norman, which are of late date for the style (SHARPE, in BUILDER *Journal*, 1851, viii, 418-9; 431: View in B. N. *J.*, 1870, xviii, 320; transept, 1873, xxv, 674, and in VIOLLET-LE-DUC, *Entretiens*): 1200-22 the additional west front or portico: *cir.* 1370 (or 1408) the porch, parvise, library, galilee or consistory court, with its upper chamber: and the retro-choir or "new building" with its fine vaulting, 1438, completed 1496-1528 (section in WARE, *Arches*, 8vo., 1809, pl. 17, who considers it, p. 61, to have been erected by the designer and workmen employed at King's College Chapel, Cambridge). Peterborough was selected 1545 as the seat of a new bishopric; the buildings were much injured in the civil wars, and the church given to the parish, who pulled down 1651 the Lady chapel erected 1272-90, for its materials. The cathedral is built entirely of Barnack stone. The west front, etc., was restored from 1827; in 1832 a new stone organ screen; choir entirely new fitted and wood ceiling of end of XV cent. repaired, etc., by E. Blore; in 1859 it was decorated under Sir G. G. Scott, who later underpinned the north wall of the nave: the pulpit in the nave, 1873, is by E. M. Barry, R.A. The total length interior is 426 ft. The retro-choir 83 ft. 5 ins. wide, and 35 ft. deep. Choir interior 119 ft. long, 79 ft. wide, and 78 ft. high. Transepts 185 ft. long, 57 ft. wide, and 71 ft. high. Nave 226 ft. long, 33 ft. (or 35 ft. 6 ins.), 79 ft. with ailes, and 73 ft. 6 ins. (78 ft., 79 ft. 4 ins., or 81 ft.) high; west front, 156 ft. long; turrets 156 ft. high; the arches 73 ft. (or 81 ft.) high in the opening, the middle one being about 18 ft. wide, the others 26 ft. The remains of the monastic buildings comprise the west front and gateway of the precincts, 1177-93; the chancel of Becket's

chapel, now part of the grammar school; the gateway of the abbot's lodgings, now that of the bishop's palace.

Amongst the other edifices of the town is a church 1860 by Ewan Christian; the town hall or market house 1671; the jail 1840 by W. J. Donthorn. Bridges, *History of North.* Paley, *Remarks on the Arch. of Peterboro' Cath.*, 8vo., Pet., 1849; 1859, 2nd edit. *Notes on 20 Parish Churches around Pet., before the Conquest to end of XV cent.*, 8vo., Pet., 1859. Winkle, *English Cathedrals*, 8vo., Lond., 1837. Bloxam, *Monumental Remains*, read before the Archæological Institute, 1861; printed in Builder *Journal*, xix, 568; and 522. Poole, *Abbey Church*, in Associated Societies, *Reports and Papers*, 1855, p. 187-221. Strickland, *Lith. Drawings of Ancient Painted Ceiling in the Nave*, 8 ft. long, and text, fol. King, *Eastern Cathedrals*, 8vo., Lond., 1862. Britton, *Cathedral Antiq.*, 4to., London, 1828.

1. 14. 15. 28. 50. 96.

PETERHEAD GRANITE. The quarries, situated about 30 miles from Aberdeen, supplying this material are noticed s. v. Granite (p. 73 and 75), both blue, and the fine warm-coloured Stirling Hill stones. The finest of the blue grey are at Cairngall, about seven miles south-west of Peterhead. Gibb, *Descr. of Granite Quarries of Aberdeenshire*, etc., read at British Association, 1859. Pratt, *Buchan*, etc., 59, etc.; 376. Muir, *On Granite Working*, read at Society of Arts, 1866, and given in Building News *Journal*, iii, 175.

PETERSBURGH; Saint. The second capital of Russia, situated at the mouth of the river Neva. A fortress was commenced 1703 by Peter the Great, which, from the difficulties attending the foundations in marshy ground, was not completed until 1740. The streets are from 60 to 120 ft. broad; the Nevsky perspective is 14,350 ft. long, the Great perspective 10,220 ft., and eight others 6,000 ft. The edifices are lofty and showy, but much plaster is used; the green roofs are iron plates painted. Much granite is used in the public structures, etc. Jeropkin 1730-48 conducted the construction of the portion Vassili-Ostrov. A cast-iron bridge over the river, 1846 opened 1850 (I. L. N., xviii, 20): *Papers on Engineering*, iii: there are numerous others over the canals, of which the Annitchkoff has four groups of equestrian statues by baron Klodt.

There are four cathedrals;—I; S. Peter and S. Paul in the fortress, 1714-33, by colonel Tressini; it contains the tombs of the imperial family; the retable 1722-26 by Zaroudnev of Moscow, Ivanov, sculptor, and Téléga, workman: the edifice was restored 1757 by Balles, a Dutchman, who 1770-72 erected the bell tower, spire, and cross, 385 ft. high; Bauer 1775-80 repaired the whole edifice. II; S. Isaac of Dalmatia, first built of timber by Peter I; rebuilt of stone by Maternovi, and Jacques Narponoff, master mason; rebuilt 1768 by Wüst and Stengel or by Rinaldi, and finished 1802 by V. Brenna or by Hegner; and was again rebuilding from 1818 by Ricard de Montferrand, and continued after his death (June 1858) by Leo von Klenze. Hallmann. Granite. Monolith. Montferrand, *Eglise Cath.*, fol., S. P., 1845. Royal Inst. of Brit. Architects, *Sessional Papers*, 1848-49. Civil Engineer, etc., *Journal*, xii, 9-12 and plate. Builder *Journal*, xvi, 343; I. L. N., xiii, 344. III; the Holy Trinity with the chapel of S. Alexander Nevsky; 1712 of timber; buildings of stone commenced 1716; church built in the form of a Latin cross, 1723, and again 1776-90 by Starov; these form part of the immense monastery, ranking third in the empire, and comprising the residence of the archbishop, an academy, seminary, library, etc., mostly by C. Hahn, who erected many other edifices for Peter the great: and IV; The mother of God of Kazan, 1801-11, by Bazhenov, carried out by Voronikhin, in the form of a Latin cross (Granite, p. 77. Monolith). The *churches* consist of S. Nicholas Morskoi, 1743, a Greek cross with five cupolas: Troitzki (Byzantine): S. Catherine Vassili Ostrov (Corinthian), by Mikhaelov: S. Sergius, 1808, by Dimertzov: Smolnoi monastery, *cir.* 1742, by count Rastrelli, to which was added the Institut de demoiselles nobles, *cir.* 1780, by Quarenghi (Ionic 730 ft. front): S. Anne, *cir.* 1760, by Feltern or Velten: Preobrajensky or Spass Preobrajensky sabor, consecrated 1754; rebuilt 1827; Roman Catholic, Knights of Malta, 1798-9 by Quarenghi: S. Vladimir, 1811: S. Peter, 1817: of the Skorbyashtnek (Sufferers), 1818, by Rusca: S. Catherine the martyr, 183 , by C. Thon: Holy Trinity, consecrated 1835: S. Peter and S. Paul, Lutheran, 1832, by Bruilov: the fine Roman Catholic in the Nevski: S. Stanislas, 1825: Dutch church and its offices, *cir.* 1822-40, by Jacot: the richly decorated English factory church for 1200: British and American, 1833: and that of the Imperial mews, by Trombara. The fall of the dome of the Koltovskoïe church is narrated by Papworth, in Royal Inst. of Brit. Architects, *Sessional Papers*, 1871-72. A Tartar mosque is given in Rusca, *Recueil*, 1810. The imperial palaces comprise;—the *Summer* palace for Anne 1731-42, by Rastrelli, the gardens having been laid out 1711-14 in the Dutch manner for Peter I; the handsome railing 1784, by Feltern. The *Anitchkov* palace 1744-48, by Rastrelli, now (1879) the residence of the Tsesarevitch. The *Winter* or imperial palace for Elizabeth 1754-62, by Rastrelli; or by Jecht (who died 1763); Feltern was clerk of the works; (Civil Engineer, etc., *Journal*, 1838, i, 162); it was burnt 29 Dec. 1837, re-erected 1838-39 by Bruilov and Starov, built (?) by Kleinmichael; in Dec. 1841 the ceiling of S. George's hall, 140 ft. by 60 ft., gave way (C. E. *J.*, iv, 367; Inst. of Civil Engineers, *Transactions*, 1847, vi, 221). The *Little Hermitage*, 1765, by Lamotte (or Vallin de la Mothe) for Catherine; portions 1775 by Feltern and Quarenghi. Rusca formed 1804 a picture gallery, etc., adjoining the Winter palace, with a theatre (*Recueil*, 1810). The *Great Hermitage* for Catherine 1775, by Feltern; this was (perhaps) rebuilt for the new museum, library, galleries for pictures and other collections, 1840-50, or 1843-47 (Greek) by Leo von Klenze (C. E. *J.*, 1843, vi, 338), and built by Kleinmichael; Waagen, *Gemäldesammlung der Ermitage*, 8vo., Munich, 1864; *Album of the Gallery*, 4to., Berlin, (1864); its theatre 1780-82, by G. Quarenghi. The *Marble* palace 1770-85, by Rinaldi (not Grimaldi as sometimes printed); rebuilt *cir.* 1847. The *Taurida* palace for Catherine II. 1780-83, by Starov, with its garden laid out à l'Anglais by J. Busch; the ball-room is 320 ft. long by 70 ft. wide; the palace was repaired 1801 by L. Rusca (in *Recueil;* Athenæum *Journal*, p. 87). The old *Michaelov* palace, now the college for engineer officers, 1797-1800, by Bazhenov, continued by Brenna, (published a work upon it) with the two pavilions in front; (Durand, *Parallèle*, edit. 1843). The grand duke (or new) Michaelov palace (Corinthian), 1819-25, by Rossi. Salle de la noblesse, *cir.* 1822-40, by Jacot. Duke de Leuchtenberg or Marie palace (Greek), 1839-44, by Stackelschneider. The residence of the family of Beloselski Beloserski, has the most beautiful staircase and richest suite of apartments in S. Petersburgh. Rusca, *Recueil*, 1810, contains also many designs for large and small houses: and Quarenghi, *Fabbriche*, 1821.

The chief public edifices comprise the following;—The fortress 1703-34 by col. Tressini, continued by col. Munich; contains also the mint, barracks for 3,000 men, the foundry 1733 by Schumacher, and other buildings. The old arsenal 1776 (Doric) by comte Gregory Orloff; new arsenal 1808 by — Dimertzov. Admiralty, with the dockyards, 1801 by Zacharov; (Rusca, *Recueil*, 1810); its naval museum; the chapel by Ricard de Montferrand. The splendid building containing the chancelleries of the general staff (état major), 1821-30, by Rossi and Bruilov; the hall for the archives is of iron 250 ft. by 100 ft., and vaulted; additions 1847. The directory senate 1710, originally prince Menzikov's palace; the general synod; and the palace of the war department. The academy of fine arts, 1765-88 (Roman Doric), by Kakorinov after designs by Lamotte; completed after 1788 by Feltern: Imperial public library (Ionic) 1795 by Socolov, completed 1800 by Rusca; 1862 a fine reading-room (*Handbook*). Offices of the minister of the interior, and of public instruction, were burnt June 1862, (Illustrated Times *Journal*, 19 July 1862, p. 185). Govern-

ment Paper office, *cir.* 1821, with fireproof floors 200 ft. by 30 ft., (three of the twenty iron girders failed, INST. OF CIVIL ENGINEERS, *Transactions*, 1847, vi, 221). Medical, etc., academy (Corinthian) 1799 by Porta. The university occupies the old building of the two colleges erected by Peter 1st, and restored 1836 for its present purpose. Russian academy by Melnikov. Academy of Sciences 1799 (Ionic) by Zakharov. Corps des voies de communication, chapel and buildings belonging to it, *cir.* 1822-40, by Jacot. Mining School 1819 (Greek Doric). Hall of Archives (Gothic) by Rossi (Clarke, engineer), entirely of iron, 142 ft. by 57 ft. The museum of imperial carriages, completed 1857-61 by Sadovnikov. Panopticon school of arts at Ochta on the Neva, 1805-7 by Sir S. Bentham, was burnt a few years afterwards. Exercising house of the Imperial Guard (Doric) by Quarenghi, 536 ft. 8 ins. long by 119 ft. wide; and the other riding school, now the museum of agriculture. Marine cadet's college 1796. State bank 1784 by G. Quarenghi; (*Le Nouveau Batiment de la Banque Impériale*, fol., 1791). *Birzha* or imperial exchange (Doric), commenced 1784 by Quarenghi, and continued 1804-11, opened 1816 by T. de Thomon or Tomon (*Recueil*, fol., 1806: GRANVILLE, 1828, ii, 303: SALLANDROUZE, *Vues*, fol., Paris, 1808). Custom house adjoining (view in PENNY MAGAZINE, 1835, iv, 469). Grand post office, *cir.* 1856, by Albert Cavos. Salt warehouse, and wine warehouse, both before 1816 by Volkhov. Gostinnoi dvor, bazaar, or merchant's inn, 1755-85, of two floors, 1,200 ft. long by 350 ft. wide; burnt June 1862. Observatory at Pulkova, 1837-8, by Bruilov. RUSCA, *Recueil*, 1810, also contains the building for the regiment des chevaliers gardes; barracks near the small river Carpofka, and others; corps d'écuries; hospitals, etc.

The Obutchov hospital, 1783; Vospitatelnoi dom or foundling hospital, on the Moika, 1788-98, accommodates 25,000; Imperial hospital for sick poor 1803 (Ionic) by Quarenghi; Military hospital for 2,000 patients; Hotel des Invalides, *cir.* 1790, by Bazhenov; Alexandrov hospital, 1864 (plan in ROY. INST. OF BRIT. ARCHITECTS, *Sessional Papers*, 1867-8, p. 280).

Great or Bolshoi theatre, 1784; 1802-4 (Ionic) by T. de Thomon or Dumot; burnt 1810-1, restored 1817 by Mauduit, who kept the old front: renovated 1836. Theatre on Aplugin island, 1826, by R. de Montferrand. Alexandrinsky theatre, 1832, by Rossi. Michael theatre, opened 1833, by Bruilov. The Little theatre, formerly the imperial library, 1801, by V. Brenna, was destroyed *cir.* 1832. A theatre *cir.* 1856 by Albert Cavos. The Ciniselli circus 1876, by W. P. Kenell; (BUILDER *Journal*, xxxiv, 811).

Equestrian statue of Peter the great, 1782, by E. M. Falconet, on a red granite boulder found at Lacta near the city, moved by Lascari (see FELTERN: CARBURI DE CEFFALONIE, *Monument*, etc., fol., Paris, 1777: MILIZIA, *Lives*, etc., 1826, ii, 79). Another equestrian statue cast for emperor Paul (1796-1801) by Martelli. Bronze statue in the Field of Mars of Suwarov 1801: to F. M. Barclay de Tolly and Kutuzov 1836, both by Boris Orlofsky: to Krylof, the poet, after 1844; admiral Krusenstein; Sir James Wylie 1859; monument to Catherine II, 1873, modelled by Mikeshin. Rumiantsov or Roumiantzov obelisk, 1799, by V. Brenna, 82 ft. 6 ins. high, of black granite (not bronze) from Serdopol; removed 1821 to its present site. Alexander I column, 1832, by Ricard de Montferrand, of granite, 84 ft. high (MONOLITH: published fol., Paris, 1836; ALLGEMEINE BAUZEITUNG, fol., Vienna, 1836, pl. 86-8). Nicholas I monument and equestrian statue, 1856-59, by Ricard de Montferrand and baron Klodt (BUILDER *Journal*, 1862, xxii, 371-4). Narvsky gate or triumphal arch, 1831-3, by Quarenghi and Stassov, erected first in timber, afterwards in iron, by Clarke and Pratt, engineers. 14. 28. 50. 96.

Peter the Great on his return to Russia adopted the English foot-rule, which is the ordinary measure used in building operations; WEALE, *London*, etc., 1851, p. 346: WOOLHOUSE, *Tables of Continental Measures*, 8vo., 1836, puts it, however, at 1·1458 English foot. In 1815 it was stated that plate glass was made so that each window could be of a single sheet; ACKERMANN, *Repository of Arts*, 1815, xv, 8; in 1840 the factory produced mirrors 14 ft. by 7 ft.

Plan de la ville de S. P., sous la direction de l'Académie Impériale, etc., 16 pl., rare, fol., 1753. SCHUBERT, *Plans of S. P.*, 26 sheets, fol., S. P., 1828. *Map* of the Society for the Diffusion of Useful Knowledge, No. 200.

KRAFFT, *Descr. exacte de la maison de Glace, construite à S. P., au mois de Janvier* 1740, 4to., S. P., 1741. STULER and STRACK, *Die Eisenbahnanlage von P.* RUSCA, *Recueil des Dessins*, fol., S. P., 1810. QUARENGHI, *Edifices construites à S. P.*, fol., S. P., 1810: and *Fabbriche e Disegni*, fol., Mil., 1821: *Country Houses at S. P.*, 16mo., 1867, pt. 1 only. SVIGNINE, *Descr. des Objets les plus remarquables de S. P.*, 4to., S. P., 1816-18, with plates, 2 vols. GRANVILLE, *Guide to S. P.*, 8vo., Lond., 1829; 3rd edit. 1835. ILLUSTRATED LONDON NEWS *Journal*, 1842, i, gives, p. 241, S. Isaac's church and the palace: 1856, xxix, 246, zarskoselo, winter palace, triumphal gate, Alexander column, and English quay: 290, Kazan church, Haymarket, and Peter the great monument: 291, hotel of count de Morny: 419, post office, academy of fine arts, and exchange: 507, état major edifice: and xxiii, 93, the emperor's palace, and 163 the admiralty. STORCH, *Picture of S. P.*, 8vo., 1801. *Picture of S. P.*, 20 views, fol., 1815. *Collection de Vues de S. P.*, 40 pl., fol., S. P., 1825. *Nouvelle Collection*, fol., 1826. *Guide de Voyageur à S. P.*, with a plan, 12mo., S. P., 1840; 1842. PENNY MAGAZINE, 1832, i, 314; iv, 471. LOUDON, *Encyc. of Gardening*, 8vo., 1850, gives plans of several gardens.

DEMIDOFF, *Voyages Pittoresques*, fol., Paris, 1840-48, pl. 14-18. COCHRANE, *Russia*, 8vo., Lond., 1824; i, 56; ii, 270. BREMNER, *Russia*, 8vo., Lond., 1839, i, 53. MEYER, *Darstellungen aus Russlands*, 8vo., Hamb., 1829. HEATH, *Picturesque Annual*, 14 pl., 8vo., Lond., 1836. W. K. KELLY, *History of Russia*, from Karamsin, Tooke, and Ségur, 2 vols., 8vo., Lond., 1854 (Bohn). STAEHLIN, *Anecdotes*, 8vo., Lond., 1788, p. 197. KLYNDER, *Galerie de la maison Romanoff; Portraits en phot. d'après les tableaux originaux du Palais d'Hiver Imperial*, 16mo., S. P., 1864. SVININ, *Sketches of Russia*, 1831. ALLEN, *Opneakie*, 8vo., S. P., 1826. PUSHKAREV, *Opissanie* or *Opischakie*, 8vo., S. P., 1839; and his *S. Peters.*, 8vo., S. P., 1843. SMYTH, *Three Cities in Russia*, 12mo., Lond., 1862. J. B. ATKINSON, *Art Tour to Northern Capitals*, 8vo., Lond., 1873, p. 150. PICTON, *Notes on Architecture*, in BUILDER and BUILDING NEWS *Journals*, 1861. KOHL, *S. Peters.*, 8vo., Dresden, 1841. ACKERSCHYK, *Veshaal eciner Reize in Rusland*, 8vo., Gron., 1840. VENABLES, *Domestic scenes in Russia*, 8vo., Lond., 1839; p. 7, 97, 217, 256, 278, 287. JERRMANN, *Pictures from S. P.*, trans. by F. Hardman, 8vo., 1852. LYALL, *History of Architecture in Russia*, 4to., Lond., 1823. USEVOLOJSKY, *Dict. Géog.-hist. de l'empire de Russie*, 2 vols., 8vo., Moscow, 1823.

There are numerous imperial summer residences of note contiguous to the city. One on the isle of Yelaguine; another on the isle of Kamenoi Ostrov, a palace belonging to the grand duke Michael (both in *Nouv. Collect.*, 1826). *Peterhof* has a large garden and water-works for fête days, laid out 1717-20 by J. B. A. le Blond in the geometric manner (ORNAMENTAL GARDENING); the English palace 1781 is by G. Quarenghi (GEORGI, *Descr.* 1793; LOUDON, 1850). *Mihailovsky* (Italian) for grand duke Michael; *Strelna*, 1711, by le Blond, directed by Brandt; the gardens laid out in the old French style; the palace burnt *cir.* 1730-40 was rebuilt by Rastrelli, and restored 1800; Sept. 1802 the grand terrace fell in and was rebuilt by Voronikhine after the plans of Peter I. In Dec. 1803 the chief wing was burnt; rebuilt in six months 1804 by Rusca (*Recueil*). The church dates 1764. *Oranienbaum*, 1724. *Sergiefka* palace. *Sobstvennaya*, *cir.* 1830.

Zarsko-Selo or Tsarskoe-Selo, very extensive, has an immense park laid out by Rastrelli; the palace was erected 1744-76 by Bazhenov, after a design by Rastrelli; the greater part destroyed 1787, was rebuilt by Kozakov; the two buildings adjoining consisting of a two-story Ionic colonnade over a high

basement, also a Roman bath, *cir.* 1792, are by C. Cameron, when the grounds were laid out by J. Busch into English gardens. A large portion of the edifice was burnt 1820; the Gothic ruins after 1762 by Feltern; triumphal arch to count Gregory Orlov after 1771 by Rinaldi; the Alexander palace by Quarenghi; the Catholic church 1825 by the brothers Adamini; a triumphal arch of iron, 12 May—17 Aug. 1818 by Stassov; and an arsenal, *cir.* 1865-70 (Gothic). The town of Tsarskoe-Selo has taken the place of Sophia, in which now only remains the rich church built for empress Catherine, *cir.* 1780, by Starov, in imitation of the mosque at Constantinople. ALLGEMEINE BAUZEITUNG, 1842, pl. 451-2, gives the railway station and the Vauxhall building in the park at Pavlovsky.

Pavlovsky, 1780, by Bazhenov, with a fine park laid out by L. Brown in the English manner, having in it four mausoleums by Martoss, rector of the academy of fine arts; the palace rebuilt 1803 after a fire. *Gatschina*, 1771, by Rinaldi, for prince Gregory Orlov. *Tschesme* (Gothic), 1770, by Feltern; improved *cir.* 1780, by Bazhenov. Of *Pella* for Catherine II, 1785, by Kosilov or Koslow, only three pavilions now remain. A plan of *Catherinehov*, as amended by R. de Montferrand, 1824, is bound up with *Nouv. Collect.*, 1826, in the British Museum.

PETERSBURGH STANDARD OF DEALS; see HUNDRED.

PETERSBURGH TIMBER. Petersburgh deals varied from 7 to 11 ins.; the former were used as battens, but not so good as Christiania battens. The red wood of Petersburgh is nearly equal to the Memel, but not so hard. If piled in a damp state, fungus has been seen to grow, which does not occur with Christiania deals. All white deals, with the exception of the Christiania, are not to be depended upon in joiner's work; they will do for packing cases and rough building. White Petersburgh deals never lose the property, however long they have been seasoned, of expanding and contracting with change of weather. *Report on Timber Duties*, fol., 1835. BATTEN. EXPANSION. In 1871 it was erroneously stated that Petersburgh deals were no longer in the market. The best yellow deals for building purposes is shipped from this and other Russian and Swedish ports. The Petersburgh deals are apt to be shaky, having a great many centres in the planks and deals, but the best quality are very clean and free from knots. The well-known Gromoff Petersburgh deals are marked with C. and Co., the initials of the shippers Clarke and Co. Another good brand is P B (Peter Belaieff) for best, and P B2 for second quality. SEDDON, *Notes on the Building Trades*, fol., Chatham, 1873. LASLETT, *Timber and Timber Trees*, 8vo., 1875.

PETIT ANTIQUE MARBLE, or BRECCIA PICCOLA; see BRECCIA.

PETITOR STRUCTURÆ. A term applied, *cir.* 1254-95, to an Henricus, as noticed in G. von KETTWIG.

PETITOT (ENNEMONDO ALESSANDRO), cavaliere, born 17 Feb. 1727 at Lyon, son of Simon Petitot, engineer, studied under Soufflot, gained 1745 the grand prix; studied at Rome, and returned 1750 to Paris. In (1753 or) 1760 he went to Parma as chief architect to don Filippe, and erected many buildings, including the façade of S. Pietro (BUSSI, *Opere*, ii, last plate); altered and enlarged 1767 the palazzo del giardino, by Boscoli; and designed the decorations of the salon at the château de Colorno, near the city; the sculptures were by Boudard. He published *Suite des Vases*, etc., engr. by B. Bossi, fol., Parma, 1764; 1789; 1794: who also engr. *Mascarade à la Grecque*, fol., Parma, 1771: and PACIAUDI, *Descrizione delle Feste*, etc., fol., Parma, 1769, gives designs by Petitot; *Raisonnemens sur la Perspective*, 4to., Paris, 1803, is attributed to Petitot, who died 3 Feb. 1801. DUSSIEUX, *Artistes Français*, 8vo., Paris, 1856, p. 306-7. MILIZIA, *Opere*, edit. 1827, iv, 479. 113.

A — Petitot, sculptor and architect, passed part of his life in Italy and retired to Geneva, where a son John Petitot was born 1607, who became a portrait painter in England, and died 1691: WALPOLE, *Anecdotes*, 1862 edit., ii, 381. 14. 113.

PETIT-RADEL (LOUIS FRANÇOIS), born 22 July 1740 at Paris, was a pupil of de Wailly, gained 1763 a third grand prix, and went to Rome; on his return he directed the construction of the palais Bourbon; redecorated the interior and designed 1784 the high altar to the church of S. Médard, in the rue Mouffetard at Paris: designed 1810 the abattoir at Roule (*Detached Essay*, p. 1-2) now destroyed: and the old hôtel du trésor royal. He published *Projet pour la restauration du Panthéon* (Ste. Génévière), 4to., Paris, 1799: and also engraved his *Recueil de ruines d'architecture.* He died 7th November 1818 at Paris. 110. 112. 113.

PETRA. A former very important town in the north of Arabia. A narrow valley of Wady Musa led to it, having numerous tombs cut in the rocks. Nearly at the end is the temple or tomb called Khasné or treasury of Pharoah, cut in the rock, and still in very good condition; "it is of Roman architecture, with some Grecian influence", FERGUSSON, *Handbook*, 1855, i, 349: another called *el Deir* or the convent, is given in his work, p. 351. An amphitheatre 120 ft. diameter at bottom has 33 or 38 well preserved rows of seats, and is surrounded by tombs. Beyond it is a plain about a mile square, on which are the ruins of the city, but there are only a few buildings standing, generally of the Roman period.

PENNY MAGAZINE, 1836, v, 161, 185, gives the theatre and the Khasné. *Detached Essay*, AQUEDUCT (p. 4). NAUMACHIA. VINCENT, *Periplûs of the Erythræan Sea*, ? 1807. SHAW, *Travels*, fol., Lond., 1746; 1808. BURCKHARDT, *Travels in Syria*, etc., in 1812, 4to., 1822. IRBY and MANGLES, *Travels in Egypt, etc., in* 1817-8, 8vo., Lond., 1823, p. 405; 428. LABORDE, *Voyage de l'Arabie Pétrée*, fol., Paris, 1830; and transl. 8vo., Lond., 1836. DUBOIS DE MONTPEROUX, *Voyage, etc.*, fol., Paris, 1839-43, pt. 1, pl. 19. ROBINSON, *Biblical Researches*, 3rd edit., 8vo., Lond., 1867; ii, 128-173; 521-4; 653: and *Travels in Palestine, etc.*, 8vo., Lond., 1837. HITTORFF, *Mémoire sur Pompeï et Petra*, 4to., Paris, 1866. 14. 23. 50. 96.

PETROC or PETER MALLOY, an Italian, 1534-35 superintended the erection of the buildings in the Kitay-gorod or city part, of MOSCOW (p. 131); LEIGH, *Guide*.

PETRONI (DEOTISALVI or DIOTISALVI DE'), birth-place unknown. As "magister hujus operis", according to the inscription on the pilasters at entering, he erected 1153 the circular baptistery of S. Giovanni at Pisa, in the Lombard style: about 1153 the octagon church of S. Sepulcro for the Templars in the same city, wherein occurs the inscription, "hujus operis fabricator dstesalvet nominatur"; the edifice shows a very early use of the Pointed arch: and he was engaged 1153 at the church of Sta. Maria Maggiore at Florence; VASARI, *Lives*, 8vo., Lond., 1850, i, 29. DELLA VALLE, *Lettere Sanese*, 4to., Venice, 1782, ii, 18. *Metrop. Fiorentino*, 1820, p. 20, mentions 1425 Nero Nigii Dietisalvi. VASARI, *Vite*, edit. Flor., 1846-57, i, 210. TAYLOR and CRESY, *Pisa*, fol., Lond., 1829. HOPE, *Arch.*, p. 367. WEBB, *Continental Ecclesiology*, 8vo., Lond., 1848, p. 358; 360. CICOGNARA, *Scultura*, fol., Ven., 1813, i, 187-8. (BUONO). 3.

PETROSELINUM SATIVUM; see PARSLEY.

PETRUCCI (B.); see PERUZZI (B.)

PETWORTH MARBLE; see SUSSEX MARBLE.

PEULVAN, or *pile de pierre.* See MAENHIR.

PEW or PUE (Fr. *puie*, balcony; *piou; banc d'église*). Authors upon ecclesiastical law almost invariably use the expression "church seat" in place of pew. The word applied, perhaps to a bench only, occurs as early as 1449, "puying of the church" at Stamford; PECK, *Annals*, 1727, xiv, 25; 1474-76, "makyng of a new bench in a pew", Accounts of S. Andrew Hubbard church, Eastcheap; BUILDING NEWS *Journal*, 1871, p. 487; 1475, "making of the new seats called le pewis"; NOTES AND QUERIES, 1863, 3 Ser., iii, 260; 1488, "to be buried—at my pew's end"; N. AND Q., 3rd Ser., iii, 318. An *enclosed* sitting is perhaps first mentioned, 1518 and 1525, "making of two pew doors", etc., Churchwarden Accounts of S. Margaret Pattens; 1520, "my body to be buried in erth at my pew dore"; N. AND Q., 2 Ser., vi, 189. An enclosure dated before 1486 is to be

seen (one of two) in Lavenham church, Suffolk, having pillared and carved work similar to the screen of Henry VII's tomb. In Breedon church, Leicestershire, an elaborate pew has a canopy: another covered in occurs at Langley V. Mary in West Drayton; a similar one at Shellesley Wash, Worcestershire; N. AND Q., 3 Ser., vii, 267; and others named in ECCLESIOLOGIST *Journal*, ii, 101-4. "Two rooms or petitions with each of them a chimney", in Thornbury church, Gloucestershire; PARKER, *Domestic Arch.*, 8vo., Oxford, 1859, iii, 266.

In noticing the pricing of pews in 1545, E. FRESHFIELD, *On the Parish Books of S. Margaret Lothbury, etc.*, in the ARCHÆOLOGIA, 1877, xlv, 61, writes, "This book is therefore one more evidence if any such were needed of the fact that pews and the letting of them are not the inventions of our Reformers". UDALL, *Communion Comelinesse*, 4to., Lond., 1641, notices that "the new manner of making the pewes there (in London) of later times, where they are built higher and larger—than the ancient pewes, which were not above the middle of the body.—Since the new building of the pewes so high as they be in some places, which is a thing come in but lately"; ECCLESIOLOGIST *Journal*, 1867, p. 83. But the speech of Richard Corbet, bishop of Norwich 1632-35, in aid of a contribution to the repairs of St. Paul's cathedral, would show that these are not correct. He remarks, "Stately pews are now become tabernacles, with rings and curtains to them;—We have casements, locks and keys, curtains and cushions—I had almost said, bolsters and pillows"; LONGMAN, *Three Cathedrals*, 8vo., 1873, p. 61. "Pews existed in England anterior to the Reformation; and manorial and faculty pews, as they are called, were the early forerunners of those hideous pews that now so deform our churches"; N. AND Q., 1864, vi, 474: and 1867, xii, 133-4.

ENGLISH, *Laws of Pews or Seats in Churches*, 8vo., Lond., 1826. CAMBRIDGE CAMDEN SOCIETY, *History of Pews*, 8vo., Camb., 1841; 1842. Rev. J. MEDLEY, *The Advantages of Open Seats*, printed in EXETER ARCH. SOCIETY, *Transactions*, 4to., Exeter, 1842, i, 155-70. BOWDEN, *A few Remarks on Pews*, 1843. Rev. A. W. BROWN, *On the Law of Pews*, in FAWCETT, *Church Rides—Scarborough*, 1848. *The Law of Pews; A Case at Yeovil*, in ECCLESIOLOGIST *Journal*, 1851, xii, 16-19. JACOB, *Law Dict.*, s. v. Church. BLOXAM, *Gothic Arch.*; 12mo., 1859, p. 464-5. A number of instances of "pews" on the continent are named in BUILDER *Journal*, 1863, xxi, 235. BURN, *Ecclesiastical Law*, edit. by Phillimore; and in CHURCH BUILDER *Journal*, 1868, p. 23: and 1866, p. 122. SEAT.

PEW HINGE. A door to a pew was ordinarily hung with a projecting BUTT HINGE. A better sort had a knuckle formed with a rounded top and bottom, giving it the appearance of an egg, whence the name of "egg joint hinge". PARLIAMENT HINGE.

PEWTER (Fr. *étain*). An alloy of lead and tin, and for some purposes of antimony. SALMON, *Art du potier d'étain*, fol., Paris, 1788. 14.

PEYNTON (THOMAS), *latamo*, at Ely cathedral, had 1471 a pension granted to him for his long services by prior Henry de Peterborough, of 11 marks and a gown. The document, ex libro Ms^co^ Epi. Elien. not. B, p. 34, is given in COLE *MS.* vol. xii, in British Museum, *Addit. MS.*, 5813, fol. 98*b* ink.

PEYNTOUR (JOHN), surveyor, was appointed with others 1349, 23 king Edward III, to press hewers of stone and other artificers, for building the castle at Windsor. BRITTON, *Arch. Antiq.*, 4to., 1812, iii, 30.

PEYRE (MARIE JOSEPH), l'ainé, born 1730 at Paris, became a disciple of Blondel, gained 1751 the *grand prix* and went to Rome. He designed 1762 a house in the boulevard du Clos Payen (LEGRAND et LANDON, *Descr. de Paris*, 8vo., Paris, 1808, iv, 21: also in KRAFFT et RANSONNETTE, *Maisons, etc.*, fol., Paris, 1802, pl. 38); and with de Wailly 1779-82 the theatre for French comedy, called 1794 l'Odéon, which was burnt 1799; (CHALGRIN; MOREAU DESPROUX; LEGRAND, etc., iii, 91); the roof as by "Peyre le jeune", (KRAFFT, *Charpenterie*, fol., Paris, 1805, ii, pl. 59, p. 21): he published *Œuvres d'Architecture*, 19 pl. of designs, with 2 of Roman baths, fol., Paris, 1765; and 2nd edit. 1795 by A. F. Peyre, 21 pl., fol., Paris, 1812; was elected 1767 member of the academy of architecture; and died at Choisy-le-Roi, 11 August 1785. LANCE, *Dict.*, 1872. 113.

PEYRE (ANTOINE FRANÇOIS), *le jeune*, born 5 (GABET) or 17 April, 1739 at Paris, was a pupil of his brother MARIE JOSEPH, obtained 1762 the grand prix, and was sent to Rome. On his return he was appointed contrôleur des bâtimens du roi at S. Germain and at Fontainebleau; member 1777 of the academy of architecture; and 1795 of the académie des beaux arts in the institut, etc. Recommended to the elector of Trèves, he designed 1778 the palace or château at Coblentz, completed by Dixnart, who made alterations (WHEWELL, *Arch. Notes*, 1842, p. 184); (a roof in KRAFFT, *Charpenterie*, fol., Paris, 1805, ii, pl. 34, p. 13; a farm, ii, pl. 41, p. 16). In 1784 he designed at S. Germains the small church to the hospice de la Charité, and another to the institution des dames hospitalierès de S. Thomas de Villeneuve: he added to and adapted the hôtel de Salm for the palais of the legion of honour, designed 1786 by Rousseau; (LEGRAND et LANDON, *Descr. de Paris*, 8vo., Paris, 1808, ii, 92): altered 1795-1805 the château de Reuille, near La Ferté sous-jouarre, for comte de Castellane, (DALY, *Revue Gén.*, iii, 78, and note); designed additions to the château at Versailles, but which were not executed; (LABORDE, *Versailles*, 8vo., Paris, 1839, p. 105). Among his many pupils were Percier and Fontaine; A. J. M. Guenepin; and J. N. Huyot. He published *Antiquités de la ville de Trèves*, 1789; *Restauration du Panthéon Français*, 4to., Paris, 1795; *Mémoire sur l'achèvement du Louvre* 1795; and some others; *Observations sur la restauration des piliers du dôme*, etc., 4to., Paris, 1806; *Projets d'Arch.*, 13 pl., fol., Paris, 1812; *Considerations sur la nécessité de retablir l'ancienne academie d'architecture*, etc., 4to., 1815; *Œuvres d'Architecture*, 80 pl., fol., Paris, 1818-20, which contains designs not executed; and *Projets de reconstruction de la salle de l'Odéon*, 7 pl., fol., Paris, 1819. He died 6th or 7th March 1823. DE QUINCY, *Notice historique sur A. F. P.*, 4to., Paris, 1823. DUSSIEUX, *Artistes Franc.*, 8vo., Paris, 1856, p. 99. LANCE, *Dict.*, 1872. 110. 113

PEYRE (ANTOINE MARIE), born 24 Feb. 1770 at Paris, a son of MARIE JOSEPH, was a pupil of his father and uncle, and of Boulée and Regnard. At Paris he 1795 arranged the musée des monumens Français; and restored the observatory buildings. He assisted the marquis d'Avèze 1797 in the arrangement of the works of art at S. Cloud for a (the first) national exhibition, frustrated the day before its opening by the events of 18th Fructidor. In 1800 he restored the old hall of the théâtre de la Gaieté which was burnt; designed 1810-12 the marché de S. Martin (dated 1816 in NORMAND, *Paris Moderne*, 4to., Paris, 1845, ii, 67-9); the theatres at Soissons, and at Lille; and 1823 the abattoir at Lisle. Appointed 1809 architect to the palais de Justice he 1824-27 restored the "voûtes intérieures" or the "voûtes souterraines", and the side next the quai de l'Horloge; designed 1823 the buildings of the Sourds-Muets; restored 1828 the Conciergerie; designed the amphitheatre of the conservatoire des Arts et Métiers, the corps de gardes, quai de la Grève (NORMAND, ii, pl. 116); and restored the château de Maisons, designed by Mansard, with that at Ecouen, for the daughters of the legion of Honour; rebuilt the école vétérinaire at Alfort; the hôtel de ville at Béthune, etc.: and 1840 restored the marché des Blancs Manteaux at Paris, designed 1813 by P. J. Delespine, adding an iron roof upon a system entirely new (NORMAND, ii, pl. 143). He published *Projets d'Architecture*, fol., Paris, 1812; *Lettre—relative à la reconstruction de l'Odéon*, 8vo., Paris, 1815; 1818, and 1819: and *Plans des hôpiteaux et hospices Civils de la ville de Paris*, 4to., Paris, 1820. He died 24, 25, or 26 Feb. 1843 at Paris. GUYOT DE FÈRE, *Biog. des Artistes Franc. contemp.* LANCE, *Dict.*, 1872. 110. 113.

PEYREGUIENS MARBLE, near Aix; see MARSEILLES.

PEYTRET (JACQUES), born at Arles, was architect et ingenieur du roi; and built 1673 the hôtel de ville in that town,

from the designs of Mansard or of de la Valfenière. SEGUIN, *Descr. d'Arles*, p. 22. LANCE, *Dict. Biog.*, 1872.

PEZZA. A measure of ground at Rome; equal to 529 square canne; FONTANA, *Della Trasportatione*, p. 37. CANNA.

PFENNIG or PFENNING (LORENZ), of Dresden, was one of the later architects to the yet unfinished tower of S. Stephen at Vienna, about 1460-75. 26. 92.

PHÆAX (It. *Feacio* or *Feacide*), constructed a number of edifices in Sicily, particularly at Agrigentum, B.C. 480-406, when the town was devastated. (GIRGENTI.) He also constructed the sewers of the town. SILLIG, *Dictionary of Artists*, 8vo., Lond., 1836, p. 93. 3. 62.

PHALERUM. An ancient port of Athens. Little remains even if its site be correctly identified. 23.

PHANE. An old spelling for VANE.

PHARIA. The modern LESINA or Lessina, an island off the coast of Dalmatia

PHAROS or PHARUS. The ancient name for a lighthouse, derived from an island near Alexandria in Egypt, on which the celebrated structure, about 550 ft. high by 150 ft. square, once reckoned amongst the wonders of the world (STRABO, xvii), was erected by Sostratus of Cnidius, son of Dexiphanes, under Ptolemy Soter, B.C. 312-283, or 294-283, and completed under Ptolemy Philadelphus, who died B.C. 247; PLINY, *H. N.*, xxxvi, 12. DONALDSON, *Arch. Numis.*, 8vo., London, 1859, pl. 92, gives the elevation from a medal, and the dimensions 135 ft. by 50 ft. JOSEPHUS, *Antiq.*, xii, 2, speaks of the heptastadium, or causeway to it, as having been in existence 283-47; and CÆSAR, *De Bello Civili*, iii, 112, says this was done, "superioribus regibus": *Mémoires de l'Academie Royale des Inscriptions*, vi, 576. DEXIPHANES. Ammonius, father of the king, restored this pharos; ANTHOL. GR., 4to., Naples, 1788-96, v, 233, eis poleis 4; which, iv, 233, eis poleis 5, refers to one at Smyrna. The colossus at Rhodes also served as a pharos. Another large one is described s. v. OSTIUM. One in the isle of Capræa is mentioned by SUETONIUS; and STEPHANUS of Byzantium names another at the mouth of the river Chrysorhoas, on the Thracian Bosphorus. The ancient Roman examples at Calais, and at Dover about 40 ft. high, are noticed s. v. LIGHTHOUSE: C. R. SMITH, *Pharos at Dover*, in BUILDER *Journal*, xxxiii, 728. The pharos at Boulogne-sur-Mer, in existence in 1643, is supposed to have been erected by Caligula, as mentioned by SUETONIUS. It was an octagon of 24 or 25 ft. on a side; with 12 galleries; a plate is given in MONTFAUCON, *Antiquites*, Suppl., iv, 50: with another of similar construction, pl. 51. On pl. 50 are two medals having a pharos on each. A round tower on the summit of a hill on the coast of Flintshire, is given in PENNANT, *Parish of Whiteford*, etc., 4to., London, 1796, p. 112. A *phrycterium* or beacon tower, near Argos, is given by DONALDSON, in STUART, etc., *Antiq. of Athens*, fol., London, 1830, iv, p. 22. ADAMS, *Lighthouse and Lightships*, 8vo., London, 1871.

A pharos in the cemetery at BRESCIA is 150 ft. high. CEMETERY BEACON. LANTERN. 2. 3. 6. 25. 78.

PHEASANTRY (Fr. *faisanderie*). A place or building for breeding, rearing, and keeping pheasants. POULTRY YARD.

PHEASANT WOOD; see HEISTERIA.

PHELLENSE MARMOR. A white marble used by the ancients, and obtained from mount Phellens. 1.

PHENGITES. A firm and brilliant stone or marble discovered in Cappadocia, in the time of Nero. Its transparency caused it to be used by the ancients in windows (PLINY). Later examples occur in S. Miniato at Florence; and at Torcello, 1008 (D'AGINCOURT, *Arch.*, pl. 22, 23, 25). Domitian is said to have had a porch or portico of this material, that when walking he might perceive what was passing outside. It is stated to be of a rich, somewhat yellowish white, or pale straw, colour, the yellowness being more marked in some places than in others. It is weak and brittle in the mass; and when broken into small pieces, it may be readily crumbled between the fingers into loose flakes of an angular appearance. It is probably ALABASTER, as s. v. Large slabs are mentioned at the temple of Minerva Polias and the Parthenon; STUART, *Athens*, fol., 1787, ii, p. 21. 1. 2. 6. 25.

PHIAL or vase; see POT CONSTRUCTION. ECHEIA.

PHIGALEIA, AND PHIGALEIAN (or Phygaleian) MARBLES; see BASSÆ. ORIENTATION. IMBREX. 14. 25.

PHILADELPHIA. An ancient town in the east of Lydia, built by Attalus Philadelphus, king of Pergamos, and now represented by ALLASHEHR. The city was taken and destroyed 1390 by Bajazet. Of the ancient city nearly all the outer wall, the ruins of a small temple, with numerous fragments, are alone visible. There is a Greek cathedral, six churches, many mosques and baths. ARUNDEL, *Seven Churches*, 8vo., 1828, p. 165-75. CHANDLER, *Travels*, p. 310, etc. 50. 23. 96.

PHILADELPHIA. The former Rabbath Ammon, and now represented by Amman or Ammon, situated on both banks of the river Amman, in Syria. It was so called in III cent. when restored by Ptolemy Philadelphus, but is now deserted. A theatre 304 ft. diam. with 42 tiers of seats, and another 100 ft. diam. once covered, remains of three small temples, a high tower probably a tomb 30 ft. square, with many other buildings, are mentioned by CHESNEY, *Expedition*, 4to., London, 1850, i, 517. LABORDE, *Voyage en Orient*, fol., Paris, 1838, ii, pl. 82, p. 98-100. LE QUIEN, *Oriens Christ.*, ii, 862. BURCKHARDT, *Travels*, p. 357 and plan. KITTO, *Physical Geography of Palestine*. ROBINSON, *Bib. Researches*, 8vo., 1867. The English and American Exploration Societies. 23. 50. 96.

PHILADELPHIA (It. *Filadelphia*). The chief city of Pennsylvania, in the United States of North America, situated between the rivers Schuylkill and Delaware. It was founded 1682; and laid out by Thomas Holme, the first surveyor-general of the province, in long lines of streets, 50 ft. wide and upwards, cutting each other at right angles. Abundance of good white granite called marble is obtained from some of the neighbouring counties. The covered timber bridge 1813 by R. Mills, over the river Schuylkill, 340 ft. span, the framework designed by Louis Wernioag or Wernwag, was burnt 1838. Another covered timber bridge is of three spans, 150 ft., 195 ft., and 150 ft.; both were drawn by C. A. BUSBY and published fol., London, 1823.

In 1875 there were 488 churches and missions. The old Swedes church 1700 is the oldest. Among the others mentioned as of note are; *Episcopal;* Christ Church, founded 1691, rebuilt 1727-30 by John Kearseley; S. Peter, 1758-61; S. Stephen (Gothic); S. Mark (Gothic), by J. Notman (ECCLESIOLOGIST *Journal*, 1849, viii, 285; ix, 13); and Holy Trinity (Norman); First (Greek), Second, Fifth, and West Arch Street (Corinthian), *Presbyterian*, churches. West Spruce Street, the Calvary, and Washington Square, churches. *Roman Catholic;* S. John (Gothic), and S. Peter and S. Paul cathedral (Corinthian), 1846 consecrated 1864. *Baptist* church, Sansom Street, by R. Mills, for 4,000 persons, said to be the best speaking and hearing room for its size in the States. Synagogue, Broad Street (Saracenic).

Carpenter's hall dates 1770; the state house 1729-34 or 1732-35 by John Kearseley, and Independence hall, are the oldest edifices; the fire-proof rooms were added *cir.* 1813 by R. Mills. Penn. bank *cir.* 1795, by B. H. B. Latrobe. Girard bank (Corinthian) 1795-98. Custom house and subtreasury formerly the second United States bank 1819-24 by — Strickland, pupil of and from designs by B. Latrobe, (CIVIL ENGINEER, ETC., *Journal*, 1841, iv, 404). Bank of North America (Italian) 1847 by J. Notman (TUTHILL, p. 338, pl. 26). Bank of Philadelphia (Gothic) by R. Mills. New bank, Chestnut Street 1857 (BUILDER *Journal*, xv, 760). United States mint (Greek Ionic) 1829 by J. Haviland. Merchants' exchange (Greek Corinthian). Commercial exchange 1870. Post office and courts and government offices (Renaissance) 1875, etc. New city hall 1875-76 by John McArthur, (BUILDER *Journal*, xxxiv, 715; 912). Penn. university covering 16 acres (Gothic) is modern. Academy of natural sciences 1847. Penn. academy of fine arts,

burnt 11 June 1845 (ILLUSTRATED LONDON NEWS, vii, 37-8), was rebuilt 1876. Athenæum (Italian) 1848 by J. Notman (TUTHILL, 266, pl. 34). Phil. library formed 1731. Mercantile library. Masonic temple (Norman) 1873, (B. *J.*, xxxiv, 1264). Public ledger building (Italian), *Account of the proceedings at its opening*, 8vo., 1868. Building for the centenary anniversary 1876 covering 20 acres (BUILDER and other *journals* for 1875-76); the Fine art gallery (Renaissance) by H. J. Schwarzmann (B. *J.*, 118), and the horticultural building, were to be permanent.

The Girard college for orphans (Greek Corinthian) 1837-47 by Thos. U. Walter, has two sets of buildings on each side, (LOUDON, *Arch. Magazine*, 8vo., 1838, v, 447-59; 707. CIVIL ENGINEER, ETC., *Journal*, 1838, i, 345; xi, 377. TUTHILL, *front.*) Hall of the society of the sons of S. George 1876 by J. H. Windrim, (B. *J.*, xxxiv, 420). Penn. hospital, the insane hospital 1841. United States naval hospital (Doric) 1832. Deaf and dumb institute 1820 by J. Haviland. Blind institute, founded 1833. Blockley almshouse for 2,000 inmates. Penn. state or eastern penitentiary at Cherry hill, completed 1829 by J. Haviland, the first erected on the panopticon system, or "Haviland plan of construction" (CIVIL ENGINEER, ETC., *Journal*, 1842, v, 49. [ROCHEFOUCALT LIANCOURT], *Prisons of Phil. by an European*, 8vo., Phil., 1796); it was imitated at Palermo. Chestnut street theatre holds 2,500 persons, and is considered one of the finest in the country. Academy of Music 1857 (Byzantine). Opera house (RUNGE, *Das neue Opernhaus*, fol., Berlin, 1860). The large Continental hotel 1860 is 6 floors high and covers 41,536 sq. ft. (B. *J.*, xxi, 92). Fairmouth park, comprising 2,740 acres along both banks of the river Schuylkill for more than seven miles; (KEYSER, *F. P., sketches, etc.*, 5th edit., 8vo., Phil., (n. d.)). The Penn treaty monument is at Kensington. A colossal bronze statue of William Penn is placed in front of the Penn. hospital. The timber roof of the Baltimore railway station, 150 ft. span, of a very cheap formation, is given in NOUVELLES ANNALES DE LA CONSTRUCTION, fol., Paris, 1856, ii, pl. 7. The Waterworks, STRICKLAND, *Reports, etc.*, fol., 1841, pl. 19-24. The Gas works, 1854; C. E. *Journal*, xvii, 384; xviii, 285.

Villa of John Dundas, and that of M. Newkirk, both by T. U. Walter, are given in TUTHILL, p. 288; 300. Three views of "Street Architecture" are given in BUILDER *Journal*, 1861, xix, 664-5. *Map* No. 201 of the Society for the Diffusion of Useful Knowledge. MEASE, *Philadelphia, an Account of its Origin, Increase, and Improvements*, etc., 8vo., Phil., 1811. WILSON, *Pict. of Phil.*, 12mo., Phil., 1823. TUTHILL, *History of Architecture*, 8vo., Phil., 1848, p. 263-6; 319. WELD, *Vacation Tour*, 8vo., Lond., 1855, p. 4; 137; 326. *Philadelphia and its Environs*, 3rd edit., 8vo., Phil., 1876. *Englishman's Illustrated Guide Book to the United States and Canada*, 3rd edit., 8vo., London, 1876. BUILDER *Journal*, 1876, xxxvi, 428. ARCHITECT *Journal*, 1850, ii, 124. RIPLEY and DANA, *American Cyclopædia*, 8vo., New York, 1875. 14. 50.

PHILÆ; ISLAND OF (Egyp. *Pilak, Ailak*, or *Ma-n-lek*, the place of the frontier: Arab. *Gezeret et Beerbeh*). It is situated in the river Nile in Egypt, near the borders of Nubia. "It is one of the richest spots of Egypt in architectural beauty, and one of the most instructive as to the evidence of buildings being raised in the real, and the mixed, Egyptian style at a period long after the race of native monarchs had ceased to rule"; SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Egyptian Antiq.*, 8vo., London, 1832, p. 145-7; and 68. The chief edifice, the temple to Ammon Osiris, approached by a court 250 ft. long, the columns being left incomplete, leads to a propylon 118 ft. long and 54 ft. high, begun by Ptolemy Philadelphus (B.C. 285-247) and sculptured by the Roman emperors down to Trajan; beyond it is a square court, on the left of which is a pseudo-peripteral temple dedicated to Isis; again beyond is another propylon leading by a now open court to the sanctuary. Against this propylon is a small amphiprostyle and *in antis* temple, dedicated to Esculapius, and considered a Greek work. FERGUSSON, *History*, 1865, states that there is no building out of Thebes which gives so favourable an impression of Egyptian art as this. The ruin of this edifice is attributed to Justinian (527-565). The so-called hypæthral temple, often called Pharaoh's bed, still unfinished, is of the time of the Ptolemies and the Cæsars; and other remains of buildings exist of the Roman period. It is a curious feature that all these buildings, and parts of the larger temple, differ in the line of their axis. DENON, pl. 41, found two granite monolithic shrines in the great temple, one of which is now in the Louvre, the other at Florence. An obelisk 22 ft. 1½ ins. high, brought to England by Belzoni, is now at Kingston Lacy, Dorsetshire; BANKES, *Geom. elevation*, etc., fol., London, 1821, states it is of the time of Ptolemy Euergetes II, B.C. 150: *Egyptian Antiquities*, 1832-36, ii, 376; BUILDER *Journal*, 1859, xvii, 606. LOTUS. On the medals of the cities are represented magnificent temples.

Plan of the Island, etc., on *Map of Nubia*, fol., 1829, by H. Parke and J. J. Scoles. HAMILTON, *Egyptiaca*. NORDEN, *Egypt*, 8vo., London, 1757, ii, pl. 138-9. *Description de l'Egypte*, fol., Paris, 1809-28, vol. i. ROSENGARTEN, *Die Arch. Stylarten*, 8vo., Bruns., 1857, p. 20. IRBY and MANGLES, *Travels in Egypt*, etc., 8vo., London, 1823, p. 106-8. ALLAN, *Mediterranean*, etc., 4to., 1834. CHABAT, *Fragments d'Arch.*, 4to., Paris, 1877, pl. 3, gives the *galerie du dromos*. EDWARDS, *Up the Nile*, 8vo., 1877, i, 307-11. HOREAU, *Panorama*, fol., Paris, 1841. 25. 28.

PHILANDRIER (GUILLAUME), in Latin PHILANDER, born 1505 at Châtillon-sur-Seine, studied Vitruvius, and completed the façade, the two cross vaults, the tribune, etc., of Rodez cathedral. Accompanying his friend Georges d'Armagnac, bishop of Rodez, to Venice, he studied under S. Serlio, and returning 1544 to Rodez, he designed the house of Armagnac in the place de l'Olmet, the plan of the terrace to the bishop's palace, with other houses there; the fortifications at Villefranche de Rouergue, etc. He took orders in 1554; designed the tomb of the cardinal d'Armagnac in Toulouse cathedral: and published an edition of *Vitruvius* with annotations, 8vo., Rome, 1544; 8vo., Paris, 1545; 4to., Lyon, 1552, with additions; and 1586; and later. He died at Toulouse 18 Feb. 1565; or 8 Feb. 1563 according to LANCE, *Dict. Biog.*, 1872. 5. 113.

PHILEUS, or PHYTHIUS of Ionia, wrote a treatise on the temple of Minerva at Priene, erected *cir.* 373 B.C. VITRUVIUS, i, 1; vii, pref. 12. PHITEUS.

PHILIGRAM; see FILIGRANE.

PHILIP, King of Macedon. A stoa or portico with his name, in the island of Delos, was erected about 338 B.C. DELOS.

PHILIPPE DE BOURGOYNE; see VAGARNY (F.).

PHILIPS (GYSBERT). S. Martin's tower at Tiel was rebuilt 1440-51 by him and P. Nicolaasz. 24.

PHILIPS (.....), master mason, followed at the funeral of Oliver Cromwell, 1658: WALPOLE, *Anecdotes*, edit. 1862, p. 424; 548.

PHILIPUS. A name in an inscription, "Philipus architectus maximus hic situs est", found at Nismes. GRUTER, *Inscrip.*, 623-5. SILLIG, *Dict.*, 1836, p. 136. 23.

PHILISTER; see FILISTER; and IRONMONGERY (p. 49).

PHILLIPEVILLE. A town in Algeria. The ruins of a theatre and an amphitheatre, aqueducts and cisterns, mosaic pavements, etc., are given in DELAMÈRE, *Archeologie de l'Algerie*, 4to., Paris, 1850, pl. 15-20; 34-5, 39, and 43-5. The plan of the military hospital 1840, is given in *Illustrations*, s. v. Hospital.

PHILLIPS (THOMAS), "freemason" of Bristol 1542, is mentioned with John Petit of Wellingborough in a contract for erecting a new cross at Coventry. Harleian MS., 6466, p. 37, in ink; printed in HEARNE, *Liber Niger*, ii, 598 note, 601.

PHILO (Ital. *Filone*). He was celebrated for having constructed at Athens an armament of a thousand vessels, which were burnt when Athens was captured by Sylla B.C. 86. VIT-

RUVIUS, vii, Pref. 12, mentions him as having written "*de Ædium Sacrarum Symmetriis et de Armamentario quod fecerat Piræi in Portu*". Two works on Architecture are extant, written by PHILO of Byzantium, who lived about the middle of II century before Christ, but these two can hardly be the same individual. SILLIG, *Dict. of Artists*, 8vo., London, 1836, p. 99. The theatre (of Bacchus) at Athens, finished by Ariobarzanes and rebuilt by Hadrian, is attributed to PHILO; or he repaired and improved it, STUART, etc., *Athens*, edit. by KINNARD, 1825, ii, 81. PHILO is said to have added B.C. 318, under Demetrius Phalareus, the external portico to the temple to Ceres and Proserpine at Eleusis designed by Ictinus about B.C. 440: VITR., vii, pref. DALY, *Rev. Gen.*, xxx, 72. 3. 5.

PHILOCLES of Acharnae. He was employed at the Erechtheion or temple to Minerva Polias at Athens, Olym. III, B.C. 336-332, according to the inscription found by Dr. Chandler. SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Elgin Marbles*, 8vo., London, 1833, ii, 35. WILKINS, *Prolusiones*, 4to., London, 1837, p. 194, gives the date of B.C. 408. BÖCKH, *Corp. Inscrip.*, No. 160, i.

PHILOXENUS; see MESSIDIUS.

PHITEUS, PHYTEUS and Pytheus. He wrote a treatise upon a Mausoleum, erected by himself and SATYRUS, Olymp. 106-7, B.C. 355-4. This is supposed to refer to that erection at HALICARNASSUS. AMALTH., iii, 286; VITRUVIUS, vii, pref. 12. SILLIG, *Dict.*, 1836. MILIZIA states that he added the pyramid of steps on which was placed the chariot. PHILEUS. 3. 5. 59.

PHŒBUS; see APOLLO.

PHŒNICIAN ART. Phœnice was a country which extended along the eastern coast of the Mediterranean. Its most southerly town was Acco (Gr. Acca and Ptolemais; later S. Jean d'Acre); then Tyre; Sidon; Berytus (Rom. Felix Julia; now Bairuth or Beirut); Byblos; Botrus; Tripolis; Orthosias; and Aradus (Arvad of the Old Testament); these were more or less celebrated for arts and manufactures. The nation was also renowned for its commercial enterprise. It supplied the western nations with different commodities of the East, which were brought to Tyre by caravans from Arabia and from Babylon: it planted numerous and powerful colonies on the north coast of Africa, as at Carthage; in Spain; Sicily, and Malta, and it visited Britain, probably through France by Marseilles. Hiram, king of Tyre, supplied artificers to king Solomon; and the workmanship of the artists of Sidon was celebrated in the Greek towns of Asia Minor as early as the time of HOMER, *Iliad*, xxii, 741: *Odyssey*, xv, 118. Traces of early Phœnician settlers at Camirus in Rhodes, are mentioned by BILIOTTI and SALZMANN: in Cyprus by ROSS, WADDINGTON, and DE VOGÜÉ; at Tyre, Sidon, Byblos and Aradus, by RENAN. Phœnician inscriptions were found on articles at Nimroud by LAYARD. Near Valci, at Cære, and other places in Etruria, have been found numerous articles presumably of Phœnician workmanship. No important remains of Phœnician architecture have yet (1879) been found. "The earliest specimens of Greek art, and the specimens of presumed Phœnician art have this in common,—that on both the ever-recurring ornament is the lotus and a fan-shaped flower, and that winged figures and monsters constantly occur, intermixed with friezes of animals. These characteristics seemed borrowed from Assyria. Another is the obvious imitation of Egyptian symbols and ornaments, as in the examples from Rhodes and Etruria"; NEWTON, *Phœnician Art*, read before the Archæological Institute at Dorchester, August 1865; and printed in BUILDER *Journal*, xxiii, 603-4. GARUCCI, *Discovery at Veii, etc.*, in ARCHÆOLOGIA, xli, 187-206. 14. 23.

LENORMANT, *Monuments Phéniciens*, describing temples or tombs at Djebel-heim and Mnaidra, in DALY, *Revue Gén.*, 4to., Paris, 1841, ii, 497-9, pl. 21. BATISSIER, *Hist. de l'Art Monumentale*, 8vo., Paris, 1845, p. 70-8, describing the tomb called Gigantèja in the island of Gozzo. GESENIUS, *Phœniciæ Monumenta*, 4to., Leipzig, 1837, 46 pl. HEEREN, *Hist. Researches in the Asiatic Nations*, 8vo., 1833. EADIE, *Early Oriental History*, in SMEDLEY, Encyc. Metrop., 8vo., 1848. KENRICK, *Phœnicia*, 8vo., 1855. CORNEWALL LEWIS, *History of the Astronomy of the Ancients*, 8vo., 1862. MOVERS, *Die Punischen texte im Pœnubus des Plautus*, 8vo., Breslau, 1845. DAUX, *Les Emporia Phéniciens, recherches sur leur origine, et leur emplacement dans le Zougis et le Byzacium (Afrique du nord)*, 9 pl., 8vo., 1869. RENAN, *Mission de Phénice*, dirigée par, fol., Paris, 1862- , reviewed in BUILDER *Journal*, 1862, xx, 161; sepulchres chiefly at Säida. GERHARD, *Essay*, 1846, but these are probably of the Roman period. FALBE, *Recherches sur l'emplacement de Carthage*, 8vo., Paris, 1833. PORTER, *Giant Cities*, 8vo., 1867, p. 271.

PHŒNIX. A fabulous bird living to a very advanced age, and then destroying itself on a funereal pile of sweet wood and gums, when its ashes gave birth to another phœnix. In Egyptian works, it is represented in the form of a bird, with wings partly raised, and seated upon its open claws, having at the back of its head a small tuft of feathers, and in front it raises two human hands, as if in an attitude of prayer. It is supposed to be a type of the Sothic period, the great year of the Egyptians. The story of its rising from its ashes was a later invention. According to Sir G. WILKINSON, the Egyptian name signified "sæculum" or a period of years; WESTROPP, *Art Companion*, 8vo., London, 1868, p. 153. The bird, symbolising the Resurrection, is seen represented in the middle of a three-pointed star in a mosaic in the church of S. Praxidius; in the church of SS. Cosmas and Damian with a glory of seven rays, 350 and 818 A.D.; CIAMPINI, *Vet. Mont.*, ii, pl. 16: and with a nimbus, pl. 47, and 52, where it is toothed; this last is also engraved in MUNTER, *Sinnbilder, etc., ou figures symb. des premiers chrétiens*, 4to., pl. 3; 68. CAMERARIO, *Cent. symb. et emblem.*, fol., 1590; 1595. BARLOW, *Symbolism in reference to Art*, in Roy. Inst. of British Archts., *Sessional Papers*, 1860, p. 108.

At the church of S. Cesarius at Rome, a phœnix is carved in the capitals between roses and lotus: another in the tympanum of the south transept at S. Paul's cathedral, London, 18 ft. long and 9 ft. high, was carved by C. G. Cibber, who was paid £6 for the model and £100 for the sculpture; (BUILDER *Journal*, 1861, xix, 546); it was inserted by Sir C. Wren to exemplify the re-erection of that edifice after the great fire; LONGMAN, *Three Cathedrals, etc.*, 8vo., Lond., 1873, p. 127. PEACOCK. 6. 7.

PHŒNIX DACTYLIFERA, the Date palm (PALM, p. 26). In Christian mosaics the Tree of Life is represented by it. It was largely introduced in the decoration of Solomon's temple; 1 KINGS, vi, 29, 32, 35; and vii, 26.

PHOLAS; see MARINE WORM.

PHONICS. The doctrine of sounds; see ACOUSTICS.

PHOOL; see GÙL.

PHORI; architect of the palace of Rameses II meiamen; a name found by Champollion le Jeune at Silsilis. He was a royal scribe and especially charged with the erection of such buildings. *J. M. L.

PHOTISTERIUM (Gr.). The ancient name of a baptistery. BINGHAM, *Origines*, 1840, ii, 465.

PHRYGIA. One of the most important provinces of Asia Minor. VITRUVIUS, ii, 1, remarks that the natives hollowed out the hills for habitations; this was confirmed by HAMILTON, *Researches*, ii, 250; 288. TEXIER, *Asie Mineure*, i, 210, describes an immense town thus cut out, situated near Boghaqkieni. The lion gate at Mycenæ reappears in several places; AINSWORTH, *Travels*, ii, 58; LEAKE, *Asia Minor*, 28. STEUART, *Ancient Mons., with inscriptions, still existing in Lydia and Phrygia*, fol., 1842. EADIE, *Early Oriental Hist.*, in SMEDLEY, *Encyc. Metrop.*, 8vo., 1848. E. J. DAVIS, *Anatolica*, 8vo., 1875. DENNIS, *Etruria*, 8vo., 1848, who remarks on the analogy of Phrygia to Etruria in its alphabet, and in its monuments. PERROT and GUILLAUME, *Explor. Arch.*, fol., Paris, 1862-72. 23.

PHRYGIAN MARBLE; the same as MARMOR SYNNADICUM.

PHRYGIUM OPUS. The Latin term, according to the *Vocabolario* degli Accademici della Crusca, fol., Flor., 1735, for

PIAZZA



PIAZZA LORETTO.

E.W.Dawes, M.I.B.A.

Rabesco, or Arabesco; and explained "Tratta fuor dell' astuccio la lancetta, intagliar quasi a giuoco vari segni, e rabeschi." (ARABESQUE.) For Phrygian marble, and columns, see MARTIAL, *Ep.*, ix, 77; HORAT., *Carm.*, III, 1; and JUVENAL, *Sat.*, xiv, 307.

PHRYCTORION. A Greek watch tower, from whence a sentinel could give notice of the approach of an hostile force, by means of fire. DONALDSON, in STUART and REVETT, *Antiq. of Athens*, fol., London, 1830, iv, p. 22, and plate.

PHRYS; see VREDEMAN (HANS).

PHYGALEIA; now written PHIGALEIA.

PHYLLANTHUS EMBLICA. The fruit of this plant is said to have given its name, Amalaka, to the peculiar top of certain towers in India, as the Black Pagoda at Kanaruc: FERGUSSON, *Indian Architecture*, 8vo., London, 1876, p. 222 and 435, however, considers this to be a very improbable origin of the form.

PHYLLOCLADUS ASPLENIFOLIA and RHOMBOIDALIS, celery-topped pine. A native of Van Diemen's Land. It attains a height of 150 ft., and a diameter of 2 ft. The wood is close-grained, beautifully white, and well adapted for floor boards, fittings, furniture, etc.; and young trees for masts and yards; BUILDING NEWS *Journal*, 1859, v, 669. 71.

PHYROS, is said to have written on architecture. 3.

PHYTEUS; see PHITEUS and PYTHEUS.

PHYTHIUS; see PHILEUS.

PIACENZA (the Roman *Placentia* as early as 224 B.C.; Fr. *Plaisance*). A town of the duchy of Parma, situated near the confluence of the river Po with the Trebbia. The fortifications were commenced 1526 by G. Leno under A. San Gallo and M. San Michele; the pentagonal citadel was begun 1547. Two equestrian statues of bronze of the dukes Ranuccio I and Alessandro Farnese, by F. Mocchi da Montevarchi, were cast by Marcello of Rome and erected 1620 and 1624; a marble statue 1867 of G. D. Romagnesi. Piacenza is the see of a bishop. The *duomo* under the invocation of the Virgin dating 1122-33 (LOMBARD, p. 125) is 360 ft. long, 210 ft. wide, and 125 ft. high in the nave. The following inscription, "Centum viceni duo XPI mille fuere anni cum ceptum fuit hoc laudabile templum", is given in DE CAUMONT, *Excurs. Archéologique*, in BULL. MON., 1841 or 42; and reprinted in COMITÉ HIST. DES ARTS, ETC., *Bulletin*, 8vo., Paris, 1842-3, ii, 58. The *scurolo* or crypt is a complete church of itself. A brick campanile dates 1333; and a central porch from 1564; (OSTEN, pl. 20). S. Antonino, the former *duomo*, founded 324, was altered 1562; the north porch dates 1350 (OSTEN, pl. 24). S. Francesco il Grande 1278 (Lombard and Pointed). S. Giovanni in Canale, founded by the Knights Templars, has a chapel of the Virgin by L. Tomba. S. Eustachio, ruined, has details of terra cotta. S. Sisto (a very effective plan; CHURCH BUILDER *Journal*, 1879, p. 175); façade *cir.* 1525; the tomb of Margaret of Austria died 1586, was carved by Giacinto Fiorentino. S. Agostino, suppressed, is a five-aisled church by B. da Vignola; the façade 1786 is by Moriggia. Sta. Maria di Campagna, 1522, and said to be by Bramante, is in the form of a Greek cross, but the choir was lengthened 1791. S. Savino founded 903; crypt with a tesselated pavement having the signs of the zodiac is ancient; the church rebuilt *cir.* 1550. S. Sepolcro, suppressed, is of brick, 1513 by Bramante.

The ducal palace or palazzo Farnese (now a barrack) 1558 is by B. da Vignola, superintended by his son, but never completed, and now nearly destroyed; on the west side is a portion of the citadel erected 1395. The *prefettura* was the palazzo Mandelli. The *podesteria*, or palazzo communale or publico, 1281, is of brick and terra cotta; (OSTEN, pl. 19; GALLY KNIGHT, *Eccles. Arch.*, 1844, ii. STREET, *Brick, etc., Architecture*, 1855, p. 18). Palazzo del governo, XV cent., was repaired by L. Tomba. Palazzo de' tribunali, of brick, was the palazzo Landi. The ospedale grande is of large extent. The teatro Anguisola *cir.* 1795 is by C. Morelli; a theatre 1803-4 by L. Tomba. The Collegio de' Mercanti dates 1677.

Illustrations, Angle; Bench end; Capital. POGGIALI, *Memorie per la Storia Let. di P.*, 4to., 1778; 1789: and his *Memorie Storiche*, 4to., 1757. *Descrizione dei Mon. e Pitture di P.*, 8vo., 1828. OSTEN, *Bauwerke*, fol., Darmstadt, 1848. CAMPI. *Dell' Historia P.*, fol., 1651; 1659; 1662. 14. 50. 28. 96.

PIAZZA (Fr. *place*; Ger. *platz*). The Italian term for an open public space, surrounded by buildings; *Illustrations*, 1849-50, Loreto, pl. 49. In England it has been applied to the arcading in an open place. 14. 19.

PICARD DE LORDAT is mentioned 1308 as the architect to Gaston Phœbus at PAU.

PICCHIATTI, detto Picchetto and Picchiano (BARTOLOMMEO), of Ferrara, practised at Naples, where he designed 1601-5 the round (or octagonal) church del Monte della Misericordia (or by his son); the atrium and stairs to that of Sta. Maria Egizziaca detta Pizzofalcone, executed by M. Guglielmelli; 1608-51 reconstructed the hall and staircase (restored *cir.* 1860) to the palazzo reale now vecchio; designed 1614 the church, B. Vergine de' Poveri Vergognosi; and 1641 that of S. Agostino della zecca, which with the Dominican church of S. Giovan Battista, completed by G. B. Nauclerio; the cloister of Sta. Croce di Lucca; and the church S. Giorgio de' Genovesi 1587-1620, are also attributed to him and to his son; the latter building is by G. Merliano. The date of Picchiatti's death seems unknown.

PICCHIATTI (FRANCESCO), of Naples, son of BARTOLOMMEO, designed the church and monastery of S. Giovanni della Monache outside porta Alba: *cir.* 1662 the church and monastery of S. Maria della Providenza called delli Miracoli; the high altar in which is by G. D. Vinaccia; rebuilt the monte de' Poveri near the Menziatura; and modernised the church of San Girolamo (36; or Geronimo, 95) delle monache, which is also said to be by his father, to whom is sometimes attributed the completion with Cafaro, about 1670, of the dockyard of the arsenal begun by the monk B. Presti whose work failed; it has been much altered: the son formed the road leading from the dock to the piazza of the palace, with the fountains; continued to the torre di S. Vincenzo, and completed the haven and mole left unfinished by D. Fontana (died 1607); restored 1697 (?) the fine church of S. Agostino della zecca; (the chancel 1761-70 is by G. Astarita): and designed the casa and church of La divina Amore, carried out 1709 by G. B. Manni. He died about 1690. 3. 36. 68. 95.

PICCIFUOGO or PIZZAFUOGO; see DATTARO (F.).

PICCINO or PICINO (.....), with V. Rizzo, added to, and repaired *cir.* 1420, the palazzo della ragione, at PADOVA, after the fire of that year. COZZO.

PICCIONE (NICOLAS), rebuilt 1750 the church of S. Eusebio, at Rome, which had been erected by O. Lunghi. LETAROUILLY, *Rome Moderne*, fol., Paris, 1825-60, pl. 152; p. 342.

PICCONE (ANTONIO), better known as Antonio San Gallo, was born about 1470 at Mugello, near Florence, was educated as a carpenter, went to his uncles G. and A. (Giamberti) da San Gallo at Rome, became their pupil, and took their surname. When the former left Rome at the close of 1507, Piccone became assistant 1507-14 to Bramante; who 1512 gave to him the execution of the corridor from the Vatican to the castle of S. Angelo. Piccone's first work was the cathedral at Montefiascone (VAS., Flor. edit., x, 66). In 1508 he designed the tomb of G. di Castro in Sta. Maria del Popolo at Rome (LET., 537); where (under pope Leo X, 1513-22) he designed *cir.* 1512-3 the palazzo Farnese in the campo del Fiore (VAS., iv, 21): *cir.* 1513 (or by his uncle Antonio) the church, with its decorations and double cupola, of the Madonna di Loreto near the column of Trajan; portions of it are by G. del Duca (ROSSI, *Romæ Templorum*, fol., pl. 61-3; FALDA, *Nuovo Teatro*, fol., Rome, 1686): the small palazzo near the gate of Venice for Marchionne Baldassini: the cloister and cistern of the monastery of S. Pietro in Vincoli with G. Giamberti (LET., 321-5; pl. 140-2); this is also said to be by Bramante (CONDIVI, *Vita di M. A. B.*, fol., Flor., 1717): and the casa Centelli near the torre di Nona. Being

sent to Gradioli by pope Leo X, he there designed the palazzo Farnese; restored the fortress at Capo di Monte: prepared a design for the fortress at Caprarola: and on his return to Rome, he designed a marble chapel in the church of S. Jacopo degli Spagnuoli, and a tomb for cardinal Alborense: the palazzo of A. di Monte, cardinal of S. Prassede in piazza del Pasquino di santi buono (destroyed *cir.* 1775): the palazzo on the piazza d'Amelia for Bart. Ferratini: another at Tolentino in la Marcha for cardinal di Rimini; and other edifices within and without Rome; where 1515 he had been appointed architect with Raffaello Sanzio (died 1520) to the church of S. Peter, succeeding his uncle Giuliano; was appointed 22 Jan. 1517 *adjutante*, having been *falegname* previously; and repaired and strengthened certain parts of Raffaello's work at the Vatican. His large model, made by his pupil A. Labacco who subsequently published it, for completing the church is still preserved (Vas., ii, 440; Woods, *Letters*, 1828, i, 363); he strengthened the foundations and piers of Bramante's work therein: and strengthened and continued the church commenced by J. Tatti Sansavino of S. Giovanni de' Fiorentino (Let., 541): designed the fortifications, perhaps not executed, of Civita Vecchia: restored the fortress of Montefiascone, built for pope Urban and now almost entirely destroyed: designed two small temples on the larger island Viscentina, at Bolsena, for cardinal Farnese: and at Rome, the church of Sta. Maria di Monserrato near the corte Savella: the palazzo of bishop di Cervia near the new mint, but left uncompleted: and casa Marrano behind the palazzo Cibo.

Under pope Clement VII (1523-34), Piccone repaired the ailes, and inserted windows in the façade of S. Giacomo di Spagnuoli (Let., 539); a chapel therein (Let., 253), and the tabernacle: the zecca vecchia in Banchi, now the banco di S. Spirito (Vas., 1846, x, 9 and 42) attributed also to Bramante: rebuilt for the pope the court in front of the loggie of the Vatican, or added the third storey, completing 1523-7 Bramante's work on the eastern side, but altered by pope Julius III: enlarged with great care the Vatican with several stories of chambers for consistories and for the chamberlains: went 1526 with Sanmichele and others to fortify Parma and Piacenza: 1529 strengthened and repaired the church of Sta. Casa at Loreto, continuing the transepts and ailes, and decorated the piers of the cupola, called the *tribuna* (Vas., iv, 390): 1529-34 continued the canonicate there: *cir.* 1527-34, designed the curious well at Orvieto (Leclère, *Recueil*, pl. 83): 1534 the fortezza da Basso or di S. Gio. Batt. near the porta a Prato at Florence, assisted by A. Vitelli, and P. Francesco of Viterbo (Gaye): and the fortress at Ancona.

Under pope Paul III (1534-50), he was sent to Castro, where he designed the fortress, a palazzo on the Osteria, the mint, and many private houses, (the city has been demolished): begun 1530, he continued for the pope from 1545 the palazzo Farnese, of which the great cornice and cortile were added by Buonarroti, the façade is by Barozzi and Pennone (Ferrerio, *Palazzo*, pl. 3-4; or 14-16); and other buildings all now destroyed (Vas., iv, 15; v, 296): 1534 designed casa Farnesina afterwards palazzo Silvestro and Linotte, in the vicolo dell' Aquila (Let., pl. 49; or by Peruzzi): 1535 the triumphal arch of timber, in the palazzo di S. Marco in the Venice square; with the preparations for the festivities on the return of emperor Charles V from Tunis: altered the church of S. Spirito in Sassia (Let., 543): designed the mausoleum of Leo X and Clement VII (Vas., iv, 261-5): 1546 some bastions including the porta di S. Spirito, left incomplete (Gaye, ii, 344-56): strengthened almost the whole of the foundations of the Vatican palace, enlarged Peruzzi's hall of the Sistine chapel, adding the two great windows; the cappella Paolina; 1523-34 the sala regia, completed 1583 (Vas., iv, 17, 115, 120): and a church of S. Pietro (Vas., iv, 156). At Nepi, he designed for the duke of Castro the fortifications and the fortress, laid out the streets, and designed many private buildings: the fortress at Ascoli; and that at Perugia completed by Alessi (Vas., iv, 394): made new foundations for his own palazzo in via Giulia at Rome; and designed *cir.* 1545 one for himself near S. Biagio, afterwards belonging to cardinal Riccio da Montepulciano, who added many rooms to it (Falda, *Palazzi*, pl. 86-7; D'Agincourt, pl. 72, fig. 32-3); it is now pal. Sacchetti (Vas., iv, 49-59). Probably the foundations for the palace at Caprarola in its pentagonal form is due to Piccone; who, commissioned by the pope to report on an outlet for the waters of the lake of Marmora, fell sick of a fever, and died 3rd Oct. 1546 at Terni. He was buried near the Sistine chapel in S. Peter's: the inscription is preserved in Vasari. He left two sons Orazio and Giulio. Among his pupils were A. Labacco, and N. Lippi, who was his assistant at S. Peter's: he also employed his cousin Bastiano da San Gallo.

The collection of drawings in the galleria reale at Florence attributed to Bramante, of which a list is given in Vasari, Flor. edit. 1846, vii, 134, should be compared with that in iv, 49-59, many of which bear the inscription of this Antonio; and are noticed with other references herein s. v. Lazzari. Bonanni, *Hist. Templum Vat.*, fol., Rome, 1696-99, pl. 14-16, 56-8, 73. Letarouilly, *Rome Moderne*, 3 vols., fol., Paris, 1825-60. Q. de Quincy, *Vies*, 8vo., Paris, 1830, i, 179-204, with a plate of the palazzo Farnese. 3. 14. 25. 34. 68. 73.

To "Ant. da Sangallo" are given the palazzo Millini, near S. Salvatore, at Rome, in *Palazzi di Roma*, vol. iii, (1655), pl. 17-18, or 96-7: the left hand portico for the Servites of the piazza in front of the church Sta. Maria dell' Annunziata, at Florence; and the vestibule, only separated by a great arch from the church della Nunziata at Arezzo; with the four Doric columns, in Grandjean et Famin, *Arch. Toscane*, fol., Paris, 1846, pl. 66 and 100. Percier and Fontaine, *Maisons de Plaisance*, fol., Paris, 1824, pl. 39-42, attach Piccone's name in connection with the palazzo Madama; and pl. 70-72, to the palace at Caprarola.

PICCONE (Battista), called Gobbo, brother to Antonio, assisted him in the fortresses at Florence and Ancona; the chapel at Loreto; the Vatican; and the well at Orvieto, all being carried on at the same time. His copy of Vitruvius, and a translation by him are in the Corsini library at Rome. He died some few years after 1546. Vasari, edit. 1851, iv, 14, 21-3, 31.

PICK. A long pointed iron instrument with a square head fixed on at right angles to a long wood handle, wherewith rock work is broken down, as in mining (It. *zappone*; Ger. *keilhauer*). When having double arms, it is called a pick-axe, and is used for breaking up ground and paving, being used with both hands (It. *piccone*; Sp. *azadon*). Another sort has an arm on one side and a square head like a hammer at the other (It. *picchio*). MATTOCK. A small pick or gad (ACISCULUS) has a point at one end and a hammer head at the other.

PICKART (Jean). On the wall of the choir of the parish church at Aerschot, is the inscription of foundation with this name and the date 1337: it is given in Schayes, *Arch. en Belgique*, 8vo., Brux. (1850-53), iii, 181, who suggests that as the nave was begun 1331, it may be presumed the whole edifice was designed by Pickart.

PICK DRESSING or DABBING; PICKED FACE (Granite, p. 72 and 74); PICKED WORK. It is of recent (before 1852) introduction. The smooth stone is picked into a multitude of little crevices, like rockwork on a small scale. Granite axe. Ashlar. Broached work.

PICKET (Fr. *picquet* or *piquet*). A stake, cut sharp at one end, so as to be driven into the ground, for marking out lines when laying out a road, path, ditch, or cutting, as in landscape gardening; or in making foundations.

PICKFORD (J.), designed Sandon, Staffordshire, for right hon. lord Archibald Hamilton; given in Woolfe and Gandon, *Vitr. Britt.*, fol., Lond., 1771, ii, pl. 90-3.

PICKING; see Brick (p. 140).

PICKLING. In galvanising iron, both by the zinc process, as well as by the zinked tinned process, the iron plates are first

cleaned, called "pickling", by the joint action of dilute acid and friction; or scoured and cleaned as for ordinary tinning, so as to remove the scaly oxide.

PICQUET or PIQUET. A stake for setting out ground. PICKET.

PICT'S HOUSE. The earlier habitations found in the north of Scotland were pits, or slight excavations in the ground, and covered with boughs or turf. Numerous traces of these are discernible in Aberdeenshire; on the banks of Loch Fyne, Argyleshire; in the counties of Inverness and Caithness; and elsewhere. They are found in groups, and are about 7 or 8 ft. diameter. Within a few miles of Aberdeen are some hundreds, perhaps marking the site of the capital of the Taixali, in the II cent. (STUART, in ARCH. SCOTICA, ii, 54). Then followed the stone enclosure; also the "Pict's kilns", of frequent occurrence in Wigtown and Kirkcudbright shires, such being elliptical or pear-shaped enclosures about 16 ft. by 7 or 8 ft. There are also found rough oval pavings of stone bearing marks of fire, about 6 ft. diam., and surrounded with the remains of charred posts. Of the *weems* (from the Gaelic *uamha*, a cave) or subterranean dwellings, some are noticed by CHALMERS, *Caledonia*, i, 97, 262; MARTIN, *Western Isles*, p. 67; 87; 154, which he calls *eirde* or earth houses; STUART, in ARCH. SCOTICA, ii, 52. A large number were found near the old castle of Kildrummie, some 30 ft. long, and from 8 to 9 ft. wide, formed of stones 6 ft. long, and vaulted over in horizontal layers. A fine one is described by BARRY, in *Old Statistical Accounts*, xvii, 237; other weems in Orkney by THOMAS, which were not entirely subterranean: to these structures it may be convenient to retain the name of "Pict's houses". One is noted by BARRY, *History of Orkney*, p. 99; another by G. Petrie of Kirkwall, in 1849 at Wideford Hill, bay of Firth, in Orkney, given in WILSON, *Archæology, etc., of Scotland*, 8vo., Edinb., 1851, p. 74-90. To these succeeded the circular subterranean hut formed on the side of a hill, and covered with beams; one at Alvie, Inverness-shire, was 60 ft. long. Seven circular chambers were found near Inchtuthill, Inverness-shire, the floors being sunk about 20 ft.

In the ruins on Cockburn Law on the Lammermoor, was found (1870) the only specimen between Ross-shire and the Borders of which the character has been clearly proved; BUILDING NEWS *Journal*, 1870, xix, 139. A later work is termed a DUN; and the still later and larger is called a BURGH. PEEL.

THOMAS, *Account of some of the Celtic Antiquities of Orkney, including the stones of Stenness, Tumuli, and Picts' Houses*, etc., in ARCHÆOLOGIA, 1852, p. 88-136. PRATT, *Buchan*, p. 426a. SMALL, *Fifeshire*, 1823. *Picts and Laps*, etc., in BUILDER *Journal*, 1861, xix, 554, 568, 707, 841: at Kettleburn near Wick, 120 ft. diam. and 20 ft. high, 1853, xi, 62; in Orkney, 1857, xv, p. 443. MAULE, *History of the Picts*, with Sir R. Sibbald, *Observations*, in MISCELLANEA SCOTICA, 4 vols., 1818. FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1808, i and v. WARING, *Stone Mons., Tumuli, etc.*, 4to., London, 1870. FERGUSSON, *Rude Stone Monuments*, 8vo., London, 1872. 19.

PICTURE. A word occasionally used in late mediæval writings in relation to the directions left or given for the erection of an edifice. PAPWORTH, *Superintendents*, etc., in Royal Inst. of Brit. Architects, *Sessional Papers*, 1859-60, p. 45, and date 1509. DRAWING. PLATFORM. PORTRAITURE.

PICTURE GALLERY. An apartment arranged wherein to exhibit pictures. The simplest is an ordinary room with side-lights, placed either high or low. Objections have been raised to this, yet Mr. Uwins in 1837 stated that in his opinion a room on the ground floor of the London National Gallery was very well lighted, much better than any other in London, for there was an open space on each side: Sir C. Eastlake considered that small pictures might be seen to equal advantage by a side-light as by a skylight. HAYDON, *Correspondence*, 1876, p. 445, remarks, 1844, that the effect of side-lights is bad at the Liverpool gallery, but good at Borter house at Rugby; probably from their situations. The galleries at Berlin (by Schinkel); at Dresden (new, small rooms, by Semper); and at Vienna, have side-lights; at the Louvre at Paris, a side-light is given to some portions and a skylight to others; at Munich (by Klenze), the large central rooms are lighted by skylights, while side rooms, kept for small pictures, are lighted by side-lights. At Berlin, the side-lights have been found quite efficient for large pictures, when the light is admitted at a high angle by raising blinds from the bottom of the window; this system was adopted because in all the painting rooms known to Dr. Waagen, the artists had chosen a high side-light, and it was supposed that what the painter considered the best light to work by, would be the best by which to see his works. It has been proposed to place screens in a long narrow gallery *at an angle* to the side-lights, so that pictures originally painted with a light from the left or from the right should be so exhibited: small paintings should be placed in low rooms. KERR, *Gentleman's House*, 8vo., 1865, p. 190-2. WEALE, *Pictorial Handbook of London*, 12mo., 1851, p. 379, etc. BROWN, *Domestic Architecture*, 4to., (1840), p. 189.

Large picture galleries with central skylights are now so general that almost every large town has one: but another system which has been referred to with very great commendation, was introduced about 1821 in the gallery erected in Newman street, by Benj. West, P.R.A., for his own works, on the recommendation of John White (as stated, with a plan for a gallery, in BUILDER *Journal*, 1845, iii, 367). This has a skylight so arranged as to throw its light on the walls only. The system was somewhat adopted by F. Johnston in the galleries erected 1824-5 at Dublin for the Royal Hibernian Academy; WRIGHT, *Hist. Guide*, 8vo., Dublin, 1825, p. 239. West's was followed in a gallery 28 ft. 6 in. by 36 ft., erected 1829-33 at Clapham by J. B. Papworth: the *new* Munich galleries by Voit, are said to be lighted in a similar manner; BUILDER *Journal*, 1853, xi, 513; 678: xxi, 697. LANTERN. LIGHT (p. 81).

References to *illustrations* of galleries are given in this work under each city. PAPWORTH, *Museums, Libraries, and Picture Galleries*, 8vo., London, 1853, condenses the then views on this subject. Sheepshank gallery, South Kensington Museum, BUILDER *Journal*, 1858, xvi, 137, and xvii, 145. FOWKE, *Descr. of the Building*, etc., 8vo., 1858; and B. N. *J.*, iv, 201. *Lecture* by REDGRAVE, 1857, xv, 689, and in BUILDING NEWS *Journal*, 1857, iii, 1245; and iv, 201.

Arrangement of P. G., in BUILDER *Journal*, 1845, iii, 283. EASTLAKE, *Report on Lighting Randolph Gallery;* and his *Observations on the Unfitness of the present buildings for the Nat Gall.*, 8vo., 1845. New National Gallery; *Report* from the Select Committee, fol., 1850. *Copies of Correspondence*—with instructions for the preparation of designs, fol., 1869; and *Descriptions of the designs*, by the nine competitors, fol., 1866-7. STATHAM, *Suggestions as to the Arrangement and Architectural Treatment of Picture Galleries*, read before Liverpool Arch. Society, printed in B. N. *J.*, 1873, xxv, 391; and B. *J.*, xxxi, 301. *Report* of the Commission on Lighting Picture Galleries by Gas, 1859; B. N. *J.*, v, 689; B. *J.*, xvii, 507.

The following list of English picture galleries may be useful. For those abroad, reference can be made to the cities, and the names of the architects of the buildings.

	Length. Feet.	Width. Feet.	Height. Feet.
Kensington palace	326	50	—
centre	150	53	—
and others smaller ...	50	50	37 to cornice; to light, 47
Wentworth castle	180	24	30
Castle Howard	164	24	24.6
		38 c.	38 cen.
Dulwich	144	20	20
Holderness house	120	—	—
Alton Towers, entrance	108	19	22
picture	135		

	Length. Feet.	Width. Feet.	Height. Feet.
Alton Towers, Octagon room	45	45	—
Talbot gallery	155	19	22
Sion house	130	14	15
London, Buckingham palace	180 or 134	56	—
London, Sutherland house...	126	—	40 cen.
Oxford, Bodleian, top floor	129·6	24·6	N. to S.
	158·6	24·6	E.
Powis castle	117	20	
Woburn	111	17	15
Erskine house, Renfrewshire	118	21	
Burton Constable near Hull	113		19
London, Northumberland House (pulled down)	106	26·6	diag. of the square.
Holkham, Norfolk	105	21	23
London, Bridgewater house	94	24	22
Dublin, R.H. Academy	50	37	23
Council chamber	30	21·9	16
Hall	20	16	15
Cambridge, Fitzwilliam Museum	67	30	27 / 55
Edinburgh, National Gallery (see s. v.) ...	—	—	—
Chequers Court	80	16	13
Kinfauns, Dundee	82	—	—
Lord Gray's, Perthshire	82	14	—
	and a 25 ft. bow in its length.		
Drayton manor	75 or 90	16	—
	with a 26 ft. bow in its length.		
Belvoir castle	61·10	25·8	31·5
lit by windows from above.			
London, National Gallery (old) ... one	57.6	42	22
	48 6	34·6	and
	50·9	31	
two	34·6	18·0	32
Sir J. Pennethorne's, 1861	75	30	21 / 32·6
E. M. Barry's, 1876	120	40	-
	100	40	-
	40	40	—
	(3) 35	30	—
	(2) 30	30	—
London, South Kensington Museum	(2) 46	20	20
	(2) 35	20	—
London, British Institution	41·6	23·7	—
	36·9		17
	36·11		and 24 to base of skylight.
coves at side project 4 ft.; at ends, 8 ft.			
London, Sir J. Soane's museum	13 8	12·4	19·6
London, Grosvenor gallery, largest	104	35	-
smaller	60	30	—

PICTURE HANGING. In place of hanging pictures to rods or by chains suspended from horizontal rods at the ceiling, W. Potts patented 1840 a round rail combined with a cornice moulding, and on this rail slide to any part the pendant rods or chains; as explained in CIVIL ENGINEER, ETC., *Journal*, 1840, iii, 400. A similar contrivance was patented 1877 by Baker and Co. of Boston for the United States and Canada.

PICTURESQUE. Picturesqueness in architecture has been urged by many writers, but C. R. Cockerell, R.A., in his *Lectures* 1841 at the Royal Academy of Arts, admonished students to avoid aiming at it; CIVIL ENGINEER, ETC., *Journal*, iv, 121.

PRICE, *The Picturesque as compared with the Sublime and Beautiful*, etc., 8vo., London, 1810. GILPIN, *Observations on the River Wye, etc., relative chiefly to Picturesque Beauty*, 8vo., London, 1782, and other works. M(EASOM), *Landscape Architecture of the great Painters of Italy*, 55 pl., 4to., 1828. TWINING, *Elements of Picturesque Scenery*, 8vo., London, 1853-56-65. KERR, *Development of the theory of the Architecturesque*, read at Roy. Inst. of Brit. Architects, 18 Jan. 1869; printed in BUILDER *Journal*, xxvii, 61; 138; 160: *Of Picturesqueness*, 1876, xxxiv. 477: and B. N. *J.*, 1875, xxix, 554. PETIT, *Picturesqueness in Architecture*, B. N. *J.*, 1863, x, 448; 467; 488. 6. 14. 25.

PIECE; see ANGLE PIECE.

PIECE WORK. Work put out and done by the piece or job, in contradistinction to work done by the day. DAY'S WORK. LABOUR. PLUMMER, *Address to Building Operatives*, 8vo., Kettering, 1860; BUILDER *Journal*, 1860, xviii, 643: and articles in 1868, xxvi, 63, 100; 1872, xxx, 470, 509; 1874, xxxii, 463; and for 1876; also BUILDING NEWS *Journal* for 1876.

PIED; see BRACCIO.

PIEDOUCHE. The French term occasionally used in England, for the moulded base to a bust or any small figure in relief. 2. 4.

PIEDROIT. The French term for a pier or square pillar partly hid within a wall. It differs from a pilaster in having neither base nor capital. 1. 2.

PIEL (LOUIS ALEXANDRE), born at Lisieux, 20 August 1808, studied under Debret, travelled to Strasburgh, etc., and on his return published *Temple de la Madeleine, ou déclamation contre l'art païen*, 1836: directed some restoration at the cathedral of Auxerre; and designed the rebuilding of the church of S. Nicolas at Nantes, which was not carried out (rebuilt by A. B. Lassus); designed a small Gothic church near Pontarlier; furniture for the cathedral at Sens; and rebuilt the church at Lisieux; becoming a Dominican 28 May 1841, he succumbed to its austerities, and died at Bosco in Piedmont, 19 Dec. 1841. TEYSSIER, *Notice Biog.*, 8vo., Paris, 1843, p. 276. DALY, *Revue Générale*, iv, 288; v, 273. ECCLESIOLOGICAL *Journal*, 1844, iii, 124-6.

PIEN, PEIND or PIEND. A term used in the south-west districts of Scotland, being the hip rafter of a roof. It is sometimes called "pien-tree". PEND.

PIEN, or PEND, PEN, or PENNED, JOINT. The horizontal and sloping-joint made in geometrical or hanging stairs of stone, where one step fits on to another and prevents its slipping.

PIEN STONE. The stone covering the rafter in continuation of the ridge stones.

PIENZA, formerly Corsignano. A walled town of Tuscany in the val d'Orcia. It is the see of a bishop. The cathedral dedicated to the Assumption of the Virgin Mary, its campanile, the baptistery, the church of S. Giovanni, the palazzo vescovile, la canonica, the pretorio or palazzo della magistratura, and its campanile, with the immense palazzo Piccolomini, were all designed for Pius II (1458-64) by F. di Giorgio Martini; and are sometimes ascribed to B. Gamberelli called il Rosellino. A castle dates from IX cent. 28. 50. 96.

PIE POLE or PYE POLE; see BY-POLE.

PIER (Fr. *Chaine*). The vertical formation in brickwork showing at certain lengths on the face of a ragstone or flint wall, serving to steady and strengthen such work. The French dictionaries give various names according to the manner of forming it. VIOLLET-LE-DUC, *Dict.*, s. v. Chaine. 25.

PIER, written "peer" in 1734. A detached mass of construction from which spring one or two arches, as in a bridge, arcade, viaduct, or other similar continuous series of openings; or it may carry girders for a level road or railway. The thickness of the upper part of piers of bridges appears, from an examination of some of the most celebrated examples, to vary from one-seventh to one-eighth of the span of the arch; the piers of Neuilly bridge are one-ninth of the span. A pier is clear and independent, but in the abutment of a bridge it is called an "abutment pier". The mass which rises from the pavement in large edifices to support vaulting is called a pier; and the smaller mass as in mediæval structures is often so called, hence also "pier arches", in many modern publications; when of a single shaft it is called a PILLAR. Small piers are often used for hanging gates, as at the entrance to parks, court-yards, etc. In plan, a pier may be of any form, and may have plinth and capping mouldings.

The formation geometrically of a Gothic pier is shown in VITRUVIUS, edit. by Cesariano, fol., Como, 1521, p. 15a; in RORICZER, *Detached Essays*, Pinnacle: and GWILT, *Encyc.*, 1867, p. 977, et seq. It has been noticed that in the naves of some of

the Norman English cathedrals, Winchester has 13 piers in a length of 250 ft.; Ely, 12 in 250 ft.; Peterborough, 11 in 266 ft.; Norwich, 14 in 255 ft.; and Rochester, 8 in 130 ft.; Ashpitel, in *Journal of Archæological Association*, 1854, p. 276, who arranges 12 in about 200 ft. for the original nave at Rochester. Perry, *Artistic treatment of Piers, Pillars, and Columns*, printed in Building News *Journal*, 1869, xvi, 547; etc.: and Builder *Journal*, xxvii, 480, etc.

Another definition is, an upright projection from the face of a wall, parapet, or balustrading (*Illustrations*, s. v. Balustrade), for the purpose of giving stability to the construction; and when much exceeding a few diameters in height, it in strictness becomes a pilaster. Arch. Banded. Compound pier. Langley, *London Prices*, 8vo., London, 1750, p. 302 and plates, usefully notices that piers when built of brick should be formed to the dimensions of bricks, to prevent waste.

"Pier" is also applied to the mass of brick or stonework in a façade between windows (Fr. *trumeau;* Blondel, *Cours*, iv, 252). Viollet-le-Duc, *Dict.* 19.

Ware, *On the properties of Arches and their abutment piers*, 8vo., London, 1809. Bland, *Essays on the principles of construction of arches, piers, buttresses, etc.*, 8vo., London, 1839; and in Loudon, *Architectural Mag.*, 8vo., London, 1838, v, *pass. Weight per cubic foot on piers;* Inst. of Civil Engineers, *Transactions*, 1851, x, 241. For other works, see Bridge; Caisson; Cofferdam; Cylinder. Starling.

Iron lattice piers are particularly well adapted for great heights; the general features of their construction embrace the erection of a series of cast-iron pillars, trussed and framed together by lattice work. They are built with a batter uniformly increasing from the summit to the base: or in a succession of stages, each lessening in area; Building News *Journal*, 1870, xviii, 446-7.

PIER. A strong stone erection, sometimes with fender piles and framing, commencing from the shore and jutting into the sea, for a landing place, or enclosing more or less a space forming a harbour. A slighter construction for landing goods and passengers is also called a pier, or a jetty. Iron piers have been formed on the suspension principle, as at Brighton, where it is called a "chain pier".

PIERCE (Edward), painter, died a few years after the restoration, and was buried at Stamford, leaving three sons, of whom Edward was a clever statuary, who assisted Sir C. Wren, and died in 1698: Walpole, *Anecdotes*, edit. 1862, p. 390-2; see Pearce (W.). 3. 68.

PIERCED BRICK. A brick made with a number of perforations through its thickness, to ensure more perfect burning, and texture, and to some extent lightness, as it is chiefly applied to machine made bricks; such as Beart's patent bricks as made at Arsley near Hitchin. 1.

PIERCED WORK. Thin wood, slabs of marble, alabaster, or plaster, cut into patterns by perforations, frequently used for windows in Arab architecture, and probably by the ancient Romans. Street, *Gothic Arch. in Spain*, 8vo., 1865, notes examples of delicate traceries cut out of thin slabs of stone, in churches at Lugo, Tarragona, and at Tarazona (p. 135, 283, 290, 380-1): at Veruela (p. 387) are very thin slabs of alabaster. Pierced slabs are also found in Thomar church, Portugal: in Sta. Sophia at Constantinople; Salzenberg; and Pullan: in the mosque at Cordova; and at Ahmedabad, Hope and Fergusson. Prisse d'Avennes, *L'Art Arabe du Kaire*, fol., Paris, 1873. Nesbitt, *Churches of Rome earlier than* 1150; in Archæologia, 1867, xl, 193-9, pl. xi. Fret Cutting. Lattice. Trellis.

PIERCER. A sharp-pointed instrument, figured in Moxon, *Mech. Exercises*, Joinery, 4to., London, 1677-8, pl. 4, p. 90 (84, 89, 111) as a drill, with its *bitt* to form the hole; the "augre" was used for "great holes"; and the "gimblet". "The pricker was vulgarly called the awl".

PIERMARINI (Giuseppe), born 18 July 1734 at Foligno, was a son of Pietro, a merchant, went 1754 to Rome and studied under Poggi, and Vanvitelli who took him to Naples as assistant at the Caserta palace; and also to Milan to assist at the palazzo imperiale, where he left his pupil 1769 to carry out the work from his designs. Piermarini became architect to the archduke Ferdinand, inspector general of buildings, and 1776 professor of architecture. Among his designs are 1774-79 the teatro della Scala (published fol., 1789), the monte di pietà, the monte Napoleone, the luoghi Pii; 1780 the teatro Canobia; and 1828 (?) the porta Orientale di Venezia, sometimes ascribed to Vantini. He laid out several new streets, the piazza del Tagliamento, with almost the whole of the new quarter called the contrada di S. Radegonda; the public gardens and its buildings. He also designed the palazzi Greppi; Moriggia; Lasnadi; Sannazari; Litta (or by F. Ricchino); and Cusani; 1777 the extensive façade of the Belgioioso; and one of the fronts of the archbishop's palace. At Foligno 1770 with Vanvitelli he restored the cathedral. At Monza 1775-80 the imperial villa (view in Loudon, *Gardening*, 34); the villa d'Adda in Casano; the villa Cusani at Desio, where he improved and completed the church: and at Brescia 1775 he was consulted on the execution of the hall of the palazzo della loggia (Zamboni, *Brescia*, fol., Bres., 1776-88, p. 101). He retired to Foligno a few years before his death, 18 Feb. 1808 (1798 in one author). Tipaldo, *Biografia*, 8vo., Ven., 1836, iii, 30. *Elogio dell' Arch. G. P.*, 8vo., Monza, 1811. Albertolli, *Ornamente*, p. 2. 14. 62.

PIERO (Nicolo di), usually called N. il Aretino; see Lamberti (N. di P.).

PIERO della Quercia (Giacomo de). A talented sculptor, who was appointed 1435, cavaliere ed operario to the duomo at Siena: in which city he died most probably in 1442; Vasari, edit. 1850, i, 313, states 1438, in the 64th year of his age. Gaye, *Carteggio*, 8vo., Flor., 1839, i, 93; 135. 68.

PIERPOINT. A name given in the north-east part of Lancashire to what in Yorkshire is called an "outside". Pierpoints are made in flag quarries from "waste", and vary in width from 6 to 18 ins., and in thickness from 2 or 3 to 6 or 8 ins.; they are used with the natural fracture for the beds between dressings for the frontage of buildings; generally worked on the face, "pitched" or "rock" faced, or rough dressed, and backed up with bricks or rubble: and also used in party walls of those thicknesses; Building News *Journal*, 1875, xxix, 155. Builder *Journal*, 1845, iii, 547. Parpain.

PIERRE; see Montereau (P. de); see Pietro.

PIERRE. Seventh abbot of the Cistercian monastery of Notre Dame des Dunes near Bruges, commenced 1214 the rebuilding of the house. 3.

PIERRE; a monk, in XI cent. worked as architect at the cathedral and the church of S. Sauveur, at Limoges. Lance, *Dict.*

PIERRE BLEU. A stone from the quarries of Ecaussines, Felhuy, and Arguennes, is used for plinths, door and window dressings, at many towns in Holland. During the burning of this stone an ash is obtained, which from its locality is called Cendrée de Tournai, and is deemed an artificial pozzuolana Pasley, *Cements.*

PIERSON (Nicolas). Born 28 Jan. or 27 Sept. 1692, at Apremont (Meuse); directed the works of the new episcopal palace at Toul, worked at many monasteries, completed the church of the Premonstratensian order to which he belonged at Pont à Mousson, and designed the church of Ste. Marie there; rebuilt one of the wings of the monastery of Étival and built the two towers of the portail of the church: designed the abbey of Jandheurs, of which his pupil, brother Arnould, conducted the works; the portail and two towers at Salival; the church at Bougival (Lorraine); and furnished the design of a country house near Pont à Mousson for the duc de Lorraine. The date of his death is not given in Lance, *Dict. Biog.*, 1872.

PIETERMARITZBURG; Natal. The cathedral, dedicated to S. Saviour, consisting of nave and chancel, is of no architectural merit.

PIETRA DURA. Inlaid work of hard and precious stones and marbles. Also called opera di commesso, pietre commesse, and lavoro di commesso. FLORENTINE MOSAIC. COMMESSO. AGRA. DALLAWAY, *Anecdotes*, 8vo., London, 1800, p. 496. ZOBI, *Notizie storiche—dei lavori di commesso in pietre dure*, 4to., Fir., 1853, 2nd edit.

PIETRA FORTE and PIETRA SERENA; see MACIGNO.

PIETRA FRUCTICULOSA; see SILICEOUS BRECCIA.

PIETRASANTA. A town on the outskirts of Tuscany. The *duomo*, so called from its size, dedicated to S. Martino, dates from the beginning of XIII cent.; a round window in the XIV cent. façade has curious details; the pillars of Seravezza marble are XVI cent.; the pulpit is by Anastazio Stagio, *cir.* 1525. The font in the baptistery is a Roman tazza. The detached campanile dates 1380. The church of S. Agostino is XIV cent. work. There is a machicolated town-hall. 28. 50.

PIETRASANTA (GIACOMO DA), with Sebastiano, a Florentine, enlarged 1580 the church and monastery of S. Agostino built in XV cent., and erected therein the first modern cupola in Rome. LETAROUILLY, *Rome Moderne*, fol., Paris, 1825-60, pl. 157, p. 351.

PIETRO, or N. DI PIERO ARETINO; or N. D'AREZZO; see LAMBERTI; and SELLI.

PIETRO D'APUZZO; see APUZZO (P. D').

PIETRO DI PIETRO, and PETRUS PETRI; 1264 of Toledo; see PEREZ (el maestro Pedro). PETER. PIERRE. 3. 28. 66.

PIETY; Temple to. The details of this temple at Rome, having 6 columns of the Doric order in front and rear with 11 at the side including the angle ones, is given in SERLIO, *Architettura*, fol., Venice, 1663, p. 105-6. This or another is mentioned in BRAUN, *Ruins, etc., of Rome*, 12mo., Bruns., 1854, p. 26.

PIEZOMETER. A pressure gauge for determining the loss of head due to friction, bends, diaphragms, etc., in the flow of water in a pipe. NEVILLE, *Hydraulic Tables*, 8vo., 1860.

PIG. Iron, zinc, or lead, when smelted is run into a large sand mould called a "sow"; from it smaller ones are formed at right angles, called "pigs", to receive the whole of the metal. Pigs of lead have been found in England of the Roman period; examples of which are exhibited in the British Museum. SOCIETY FOR THE DIFFUSION OF USEFUL KNOWLEDGE, *Townley Gallery*, 8vo., London, 1836, ii, 285-92. PENNY MAGAZINE, v, 303. ILLUSTRATED LONDON NEWS, 1856, xxix, 352. FOTHER. CHAR.

PIGAGE (NICOLAS DE), born 1721 in Lorraine, became a pupil of the academy of architecture at Paris, was appointed 1748 architect to the Elector palatine, and constructed at Mannheim the left wing of his residence and the riding school; and designed the high altar there. He designed the gardens at Shwetzingen (engraved in 6 pl. by KUNTZ), and constructed the fountain, temples, pavilions, theatre, and orangery; 1780 the stables of the château of Dusseldorf; and the château de Benrath, near the town. He published *La Galerie électorale de Dusseldorf*, 315 pl. by Michel; Basle, 1778. He died at Mannheim in 1796, aged 75 years. DUSSIEUX, *Artistes Français*, 8vo., p. 51; 366. 68.

PIGEON HOUSE or DOVE COT (Lat. *columbarium*). An erection in which pigeons are bred. When formed of wood it is sometimes placed against a building, but pigeons thrive best when the cote is detached and elevated as on a post or the roof of a circular shed. This position is necessary if the number of birds kept be large, as they are then secure from cats and vermin. Each tier of nests requires a narrow platform for the birds to alight upon and a perching rod to each hole. The whole, except the vane if any, should be painted white. DEAN, *Farm Buildings*, etc., 4to., 1849, p. 28. A dovecote placed on the ground is reputed manorial; those of a different nature are called *volets fines;* and private persons may not have them unless possessed of a certain quantity of land on which the birds are supposed to find their food; BLONDEL, *Cours*, 8vo., Paris, 1771, iv, 172. All proprietors of lands in Scotland yielding 10 chalders of victual or 160 bolls of grain were entitled to erect a columbarium. Hence they are to be found throughout the kingdom. 5. 25. 78.

The pigeon-houses of the fellah villages in Egypt are important features and rise up as square or conical towers above the houses. The walls are built of tubular pots, each of which is a distinct nest; *Description de l'Egypte*, fol., Paris, 1809-28. Those of Ispahan are mentioned in RAWLINSON, *Five Monarchies*, ii, 297: and MORIER, *Second Journey*, 140.

The following ancient examples of dove-cotes or pigeon-houses have been noted.

At Chester le Street; BILLINGS, *County of Durham*.

At Daglingworth, Gloucester, circular of stone. Penmon priory, Anglesea, stone, square. Coverham abbey, Yorkshire. Hurley near Henley-on-Thames, circular. Lower Slaughton, Gloucester, square and gabled. On a farm in Leigh parish near Malvern, of timber. Folkesworth, Huntingdon, stone, square. Yaxley, stone, round. NOTES AND QUERIES *Journal*, 4 Ser., ii, 323; 402; 478.

At the priory at Lewes, cruciform, taken down *cir.* 1806, held 3228 cells; BUILDER *Journal*, iv, 29.

An immense one near Gyrn, Flintshire.

At Garway, Herefordshire, stone, circular, 21 tiers; figured in ARCHÆOLOGICAL *Journal*, 1845, i, 265.

At Willington, Bedfordshire; XV cent. TURNER and PARKER, *Dom. Arch.*, iii, 280.

At Codnor castle, Derbyshire, about 40 ft. diam., stone; also referring to one at Westonlarge, Kent. ILLUSTRATED LONDON NEWS, 1844, v, 36.

At Trimmens near Paxhill, Sussex, over 700 cells.

At Wickhamford, Worcester; stone, circular.

One in connection with a well, 8 ft. interior diam. and 16 ft. high, at Crossraguel abbey, Ayrshire. FORSYTH, *Beauties of Scotland*, 1805, ii, 486.

At Meslay near Tours; VERDIER et CATTOIS: and DALY, *Revue Générale*, 1849, viii, 8.

At Nesle, XV cent.: VIOLLET-LE-DUC, *Dict.*, iii, 485-8.

Manoir d'Ango, Varengeville, near Dieppe, *temp.* (?) Francis I, circular. MACQUOID, *Normandy*, p. 124.

At Boos, near Rouen, mediæval with moulded and coloured terra cotta ornaments. ARCHÆOLOGICAL *Journal*, 1852, ix, 15.

At Minerbio near Bologna, *cir.* 1545, octangular, about 25 ft. diam. and 70 ft. high, calculated to hold about 13,000 pigeons, by BAROZZI (p. 27).

Modern examples in NORMAND, *Paris Moderne*, iii, pl. 42, 51, 75, 137, 155: and Fr. *Bougeotte* or *nid à pigeon en terre cuite*, and the arrangement, in MANDAR, *Etudes d'Arch.*, fol., Paris, 1826, pl. 112.

Taubenhaus, in Rambouillet; of brick; a mast with 3 platforms to reach the 24 tiers of nests. A timber one at Bondy, with 7 tiers and raised some distance from the ground; ALLGEMEINE BAUZEITUNG, 1854, pl. 650-1.

PIGEON WOOD. A specimen from Jamaica is of a brown orange colour, which is the more general tint of the woods thus named. Another is the colour of walnut wood with blackish cloudy marks. This name has also been given to ZEBRA WOOD. GUETTARDA SPECIOSA.

PIGMENT. The coloured material used in painting, which may be arranged into two classes, opaque and transparent; the latter leave the ground on which they are applied visible through them and so produce a colour compounded of the two. Advantage is taken of this result in GLAZING. FAIRHOLT, *Dict. of Terms*, 8vo., London [1870]. COLOUR. PAINTER'S WORK.

PLINY, *Histoire de la Peinture Ancienne*. LINTON, *A list of the Principal Colours used, etc.*, in BUILDER *Journal*, 1849, vii, 412. SIRR, *China and the Chinese*, 8vo., Lond., 1849, p. 401, gives a list. SHUTTLEWORTH, *Remarks on Water Colours*, gives a good history. CHEVREUL, *De la loi du Contraste simultané des couleurs*, 8vo. and 4to., Paris, 1839; transl. by MARTEL, 8vo., Lond., 1859; and by SPANTON, 8vo., Lond., 1860. LINTON, *Ancient and Modern Colours*, 8vo., London, 1852. BARFF, *Artists' colours and pigments*, read at SOCIETY OF ARTS; printed in BUILDING NEWS *Journal*, 1870, xix, 472. HUNDERTPFUND, *Art of Painting restored to its simplest and surest principles*, 12mo., London, 1849; from *Die Malerei*, 8vo., Augs., 1847. SALTER, *Treatise on Colour and Pigments;* being FIELD, *Chromatography*, re-written, 8vo., Lond., 1869.

PIGNEROLO; see PINEROLO, in Piedmont.

PIGNY (JACQUES or JACQUET DE), also called J. GENDRE,

mason, designed or (and) built about (1487 LANCE, *Dict.*) 1443-53, the house of Jacques Cœur, now the *mairie*, etc., at BOURGES. In 1489 he was paid for making a drawing of it.

PIG STY and PIGGERY. A place for keeping and rearing pigs. The hog should be kept warm; in winter time a swing door may be hung to the upper edge of the opening, the animal soon accustoms itself to it. Where a large number is kept, it is best to have a central passage between the sties, with iron or wood hanging sheets whereby the troughs can be filled; also a store shed, and a boiling house for the piggery alone. The usual size of a good pigsty for one animal is from 6 ft. to 8 ft. square, about 4 ft. high to the roof plate in front, the open yard or pound may be of about the same size; and the fence, or wall, and partitions should be about 3 ft. 3 ins. high: the doors 2 ft. wide. The paving of the yard should be inclined to a front gutter; the best flooring for the sty is concrete laid sloping to the door; a perforated boarded floor has been tried. The trough should have a cover or flap to prevent access of other animals to it from the outside. In fattening pigs the sty is suggested to be so constructed as to have a movable partition between each animal, and to be so regulated that each pig might have room in which to get up and down but not to turn round; each stye to have a door to admit of cleaning; to be kept moderately dark and quiet; and the animal to have cinders given to it every morning. DEAN, *Essay on Farms*, 4to., 1849, p. 25. ALLGEMEINE BAUZEITUNG, fol., 1854, gives pl. 649 a *Schweinestall* at Rincy. Hog stye, s. v. PENNY CYCLOPÆDIA, recommends that the sties be placed under a common roof, as shewn in an illustration: and describes the killing, p. 261, and the curing of bacon s. v. Hampshire; Agriculture, p. 30. DALY, *Revue Générale*, s. v. *Etables*, xxiv, 66-69.

There do not appear to be any large establishments specially devoted to pig breeding. A number of sties are shown in the *Illustrations*, s. v. Farm Buildings; and in DENTON, *Farm Homesteads*, fol., London, 1864. LOUDON, *Villa, etc., Arch.*, § 389.

PIHOURT (THOMAS), 1527 designed the towers and portail of the cathedral at Rennes; LANCE, *Dict.*

PIKE, beak-iron, or bickern. The pointed end of an anvil, as C in woodcut s. v. ANVIL.

PILASTER. A term derived from the Lat. *pila* and *parasta* (Gr. ANTA), for an attached mass projecting from a wall and corresponding to the order of column with which it is used. A grand instance of the use of a pilaster or anta on one side a wall and an engaged column on the other; also of a similar pilaster or anta and a pier on the other, occurs at the large temple at Agrigentum. Two half columns with a pilaster or plain face between them at Delos, is given in STUART and REVETT, *Antiq. of Athens*, Supp. vol., noticing another instance at the mausoleum at Mylassa; another at Ephesus; *Sessional papers*, Roy. Inst. Brit. Archts., 1876-77, p. 83: two of granite at the palazzo Massimi at Rome; LETAROUILLY, *Rome Moderne*, pl. 298, p. 600-1. Sir Christ. Wren's treatment of angular pilasters showing two faces is worthy of notice: in St. Paul's cathedral, in order apparently to get rid of the massive effect of the two full sides, the pilasters have return faces. The pilaster is generally made to diminish in accordance with the column, and is sometimes fluted. There is no diminution at the baths of Diocletian, at the Pantheon at Rome, at the peristyle at S. Peter's, nor in the Corinthian pilaster to the temple of the Sun at Palmyra; and very little at the public library at Venice. In the Salviati palace at Rome, Ionic, it is wider at top than at bottom. In the example at Grotto Pola at Soana, given in CANINA, *Ant. Etr. Marit.*, fol., Rome, 1846-49, pl. 124, it does *not* diminish, and each has only three flutes on the front with two on the sides where it is finished by a fillet. There are five flutes in the antique (baths of Diocletian), and at the temple of Augustus at Pola (Corinthian); 9 at the Pantheon at Rome; 7 is best according to PALLADIO. In the temple of Marcellus it is not fluted; at the Corinthian arch of Sergius it is fluted. D'AVILER, *Cours*, 4to., Amst., 1699, p. 68-9, supplies names for the various sorts of pilasters. BLONDEL, *Cours*, 8vo., Paris, 1772, iii, 279-90. 1. 14. 25.

Striped pilasters; see RUSTIC.

Pannelled pilasters. Examples occur in STUART and REVETT, *Antiq. of Athens*, iii, ch. v; pl. 25, at arch of Theseus or Hadrian; and pl. 33, at the monument of Philopappus: they are also used at the temple at Nismes.

PILASTER BRICK. A brick formed with a notch at one end so as to bond the work at the pilasters in fence walls, as described in NEVE, 1736, s. v. Brick, 13.

PILASTER MASS, and PILASTER STRIP. These terms are used by WHEWELL, *Arch. Notes on German Churches*, p. 101; the first to denote a rectangular pier, or mass of wall with impost mouldings; the latter, a flat buttress-like projection from a wall, with the form and proportions of a pilaster, but merging into the corbel table without any capital or impost mouldings. 19.

PILASTRI (fra PAUL), conducted the works of the building of the church of S. Dominic in Prato from 1281, in all probability after the designs of fra Sisto and fra Ristoro, to the year 1300, when he was sent to Pisa, Arezzo, Florence, etc. Fra Mazzetto took charge of the works until his death 1310, and the church and monastery were completed 1322. MARCHESE, *Lives*, 8vo., Dublin, 1852, i, 32.

PILE, PILL or PILLE; see PEEL.

PILE, called "stilt" in some early books. A balk of timber, either round or square, pointed at one end, where it is generally shod with a wrought iron shoe of a weight from 10 to 15 lbs., to enable it to penetrate the ground when driven; and at the other end having an iron ring (Fr. *frette*), to prevent the fibres of the wood splitting from the blows of the monkey. In order that the piles shall drive vertically, it is necessary that the point of the shoe coincide with the axis of the pile. The depth to which piles will have to be driven, and their scantling, depend on the nature of the soil into which they are to enter. The weight brought upon them should never exceed from 400 to 500 lbs. per inch superficial of area, when the length of the pile itself does not exceed 16 times its diameter. A pile is usually from 12 to 14 ins. diameter, and from 12 to 19 ft. long. They should be driven to a depth necessary to ensure such a resistance to further descent as shall prevent their sinking under the future load. It may be considered that if a pile of 1 foot diameter does not advance more than $\frac{3}{8}$ of an inch under a series of ten blows from a monkey weighing 12 cwt., falling through a clear height of 12 feet, it would be able to bear with safety a permanent load of 25 tons. A test of 20 blows with a 7 cwt. monkey, the pile not yielding more than $\frac{1}{4}$ in., is also stated. The heads of the piles should be kept in their position and tied to one another by means of sleepers, or cill pieces, tenoned and bolted to the piles, the heads of which should be surrounded by concrete on which large stones, as Yorkshire landings, are laid to receive the superstructure. VITRUVIUS. VIOLLET-LE-DUC, *Dict. Rais.*

Of the different modes of forming a foundation in loose strata, piling is the most ancient, was the most favourably regarded, and the most generally used. "A quauery or maris and unstable foundacion, must be holpe with great pylys of alder, rammed downe, and with a frame of tymbre called a cross aundre"; HORMANUS, *Vulgaria*, 4to., London, 1519, fol., 240. 14.

Rules for Calculating the Weight upon a Pile, are given in CIVIL ENGINEER, ETC., *Journal*, 1852, xv, 37; and BUILDER *Journal*, x, 725, by major Saunders, from *Journal* of the Franklin Institute. *Supporting power of piles*, BUILDING NEWS *Journal*, 1868, xv, 125; xxiii, 276; 299.

In forming cofferdams, the piles when done with are either cut off level with the bed of the river; or are withdrawn (Fr. *deraciner*), but this sometimes endangers the structure by the settling of the soil. The piles of a dam should batter about three inches in a foot; bearing piles, guide piles, walling pieces, sleepers, and sheet piles, should all be firmly connected together by means of bolts and nuts, spikes and trenails; the sheet piles

should be of beech about 4 ins. thick and driven as close together as possible. Wood piles are often scorched, called "breaming", and when afterwards saturated with train oil, are considered to be partially protected from SEA WORMS.

Since about 1845 timber piles have been superseded by *iron piles*, not from any doubt as to the duration and resisting power of the wood, but for the sake of economy or of rapid working. Inst. of Civil Engineers, *Transactions*, i, 195. Iron SCREW PILES are now generally used when standing apart. CRESY, *Encyc. of Civil Engineering*. CONCRETE. FOUNDATION. LABELYE. PLATFORM.

PILE DRIVING. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, see Index, i-20, p. 239. HACQUART, *Battage des pieux et types de sonnettes*, 8vo., Paris, 1876. SCOTT and ROBERTSON, *On the Theory of pile driving*, read at Inst. of Mechanical Engineers; in CIVIL ENGINEER, ETC., *Journal*, 1857, xx, 385. BUILDING NEWS *Journal*, 1865, xii, 4; iii, 343 and 1219; which 1857, p. 1296, records some investigations on the question of the lasting qualities of timber under water.

Pile driving and cutting machines; ANNALES DE LA CONSTRUCTION, fol., Paris, 1856, ii, pl. 25-9. ALLGEMEINE BAUZEITUNG, 1841, pl. 380: and 1854, pl. 633. As used at Westminster Bridge 1738 by James Vauloue, and sawing off; in Crowle collection, British Museum, iii, 297 and 298. BREES, *Railway Practice*, 4to., 1840, 2 Ser., pl. 36. ROMBERG, *Zimmerwerks Baukunst*, fol., Leip., 1846-50, pl. 138; 140-142. CIVIL ENGINEER, ETC., *Journal*, 1854, xvii, 373 and plate 35.

Clarke and Varley's atmospheric pile driver, in *Illustrated London News*, 1848, xiii, 256: and CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 341: and their pneumatic pile driver, 1847, x, 91. CYLINDERS are now used for forming foundations for bridges, by Dr. Potts' pneumatic process.

PILED WORKS; see LACUSTRINE DWELLINGS.

PILÉ MARIN; see LAMBOURDE STONE.

PILGRAM (ANTON) von Bruenn, was *baumeister* 1511 at the still unfinished tower of S. Stephen's church at Vienna. G. HAUSER. 92.

NAGLER devotes nearly five pages to detailing the doubts as to a baumeister of this name; but if tradition be followed, he worked 1359 with C. von Dunkelspiel and H. von Hessen on the pulpit, and perhaps also on the organ loft. OGESSER, *Besch. der Met. Kirchen*, etc., 8vo., Vienna (1779), was the first to mention that an A. Pilgram erected as baumeister 1313 and 1350 the choir and pulpit, hence he is generally stated to be the designer of the fine church; a second in 1433 as the finisher of the principal tower; and a third in 1446 or 1450. PRIMISSER, *Ueber den baum. A. P., siehe die Wiener jahrbücher der Literatur*, 11 bd., 1820, in correcting OGESSER, identifies Pilgram 1446-50, with A. Pilgraben 1433, A. Pilchramb, maurer 1359, and A. Pilgrad, the finisher of the one tower 1407-33, who also made the pulpit, organ loft, and several altars, etc. TSCHISCHKA, *S. Step. dom*, fol., Vienna, 1843, maintains that the pulpit was erected by four skilled masons (as named) under the baumeister H. BUCHSBAUM towards the time of his death 1454. A *MS.* also stated that an A. Pilgram finished 1400 the large tower, but the knob was fixed only in 1433. 68.

DIBDIN, *Bibl. Tour*, 8vo., London, 1821, iii, 553-4, gives two bust portraits, one with a pair of compasses, the other with a square (the date 1313 has been recut on one); which are said to represent Pilgram and his assistant; or both may be the same person: they are also referred to in BUILDER *Journal*, 1858, xvi, 727. They are also said to represent Buchsbaum.

PILKINGTON (WILLIAM), born 7th Sept. 1758 at Hatfield, near Doncaster, became a pupil of Sir Robert Taylor, whom he assisted until his death in 1788. In 1782 he was appointed surveyor and architect to the Board of Customs (resigned 1810); appointed 1 July 1784 district surveyor to the parishes of S. Margaret and S. John, Westminster; 1789 surveyor and architect to the earl of Radnor; 1789 to duke of Grafton, and up to 1822; 1792 to the Sun Fire Assurance Office; and 1792 to the Charter House. Among his designs are;—1785 custom house and warehouse at Portsmouth; 1788-97 town hall at Salisbury for earl of Radnor after a design by Sir R. Taylor; 1791 London Style house and offices near Brentford, for Luke Wetten; 1791 house in Dover Street for honble. Wm. Henry Bouverie; 1798 in Half Moon Street for duke of Grafton; 1800 Chilton lodge, near Hungerford, for John Pearse (view in *Beauties of England*, etc., p. 694-5); 1801 gaol at Folkestone for earl of Radnor; 1809-11 Naval hospital and the officers' houses at Great Yarmouth, now the royal barracks, at a cost of £120,000; 1812 Clermont Lodge, Suffolk, for lord Clermont; 1812 house at Wick Hill, for Charles Pole; with large alterations in 1815; 1816 Transport Office, afterwards the board of Control, Cannon Row, Westminster; 1816-9 improving Polstead Hall, Suffolk, for Thomas Cooke; the new school at the Charter House, London; with 1812-16-20-22-24 considerable alterations at Nork near Stony Stratford, and at Calverton, for lord Arden. He retired about 1842 to his estate at Hatfield, near Doncaster, where he died in 1848. He had two sons; one, called to the bar; the other was REDMOND WILLIAM. James Howell of Westminster, a nephew, was educated in his office (1816). Joseph Parkinson was also a pupil.

PILKINGTON (REDMOND WILLIAM), son of the above, born about 1790, succeeded his father 1824 at the Charter House, and rebuilt it 1826-7 for the pensioners as it now stands, forming the quadrangle; 1826 as architect to the earl of Radnor; and 1838 as surveyor to the Sun Fire Assurance Office. He bought an estate Ash Hill, Hatfield, Yorkshire; and died suddenly 22 May 1844 at his father's house, aged 54 years. Lionel Scott Pilkington, born 1828, took after his father's death the name of Jack Hawley, and died 25 Dec. 1875.

PILLAGE. A term in use *cir.* 1700 for a square pillar with a base and capital, and usually placed behind a column to support arches, etc. 2. 4.

PILLAR. A stone column of irregular form on plan, as in mediæval architecture, always disengaged, and deviating from the proportions of the orders: in any other sense it is improperly used. It has usually a base, shaft and capital. A square pillar is a pier (Fr. *piedroit*). An antique pillar with four hollows and fillets is shown in PIRANESI, *Magnificentia*, fol., Rome, 1761, pl. 6; pl. 18, etc. J. T. PERRY, *The Artistic Treatment of Piers, Pillars and Columns*, in BUILDING NEWS *Journal*, 1869, xvi, 547; 573; and xvii, 6. A pillar is known by various epithets, which are included separately in this work. ACCOUPLEMENT; BOUNDARY STONE; CLUSTERED; MEMORIAL COLUMN: and POST; PIER; PIER ARCH; SHAFT; SPIRAL; STANCHEON. 4. 5. 14. 16. 19. 25. 41.

The Hindoo pillar (called *Kumbh, Stambh, Pach, Tambh*, in KITTOE, *Illustrations*, fol., Calcutta, 1838, pl. 20), is in its original form a square block, but it is more frequently subdivided into 8, 16, or even 32 sides; sometimes it has its angles actually rounded off; the bases and capitals however always retain the square form. At Ellora, the lower part is square and plain, the upper part is octagonal. The pillar of iron at DELHI, dates A.D. 800. The columns at Persepolis, and those in Egypt are usually termed pillars.

IRON PILLARS. Cast iron is used in modern buildings for pillars and stancheons. The greater facility of executing hollow castings must always give that form the preference over the solid one; yet great care is required in casting them from the risk of the core bending, thus making the column very thick in one part and very thin opposite to it, as much in one example as $\frac{7}{8}$ and $\frac{1}{16}$ in. respectively. HODGKINSON, by elaborate experiments, for which he received the gold medal of the Royal Society of London, established 1845 many interesting facts in regard to the relative strengths of different shapes of pillars. In particular, taking three pillars similar except as to their ends, he found their relative strengths were in the ratio of one, two, and three for pillars with flat ends, with one end flat and one end round, and with both ends round. A flat disc on the end of the pillar

gives a small additional strength. The BUILDER *Journal*, 1853, xi, 501, gives a formula for solid cast iron pillars; also a geometric mode of ascertaining diameters of solid and hollow columns having equal quantities of metal; and a table of the strength of solid pillars. From experiments recorded by E. Clark in connection with the Britannia Bridge, and other experiments more recently made in connection with the Crumlin Viaduct, it is found that a *pillar of iron*, not exceeding 30 diameters in height (that is to say, a pillar, for example, four inches in diameter, and thirty times four inches, or ten feet high), will carry, without buckling or bending, a fair load per square inch on the metal; but if the height is increased to forty diameters, it buckles with about fifteen per cent. less weight upon it. If increased to a height of 60 diameters, it buckles with about 50 per cent. less weight; and if increased to 80 diameters in height, it will buckle with about 67 per cent. less weight, and so on. *Calculations for long and short pillars*, BUILDING NEWS *Journal*, 1869, xvii, 476.

TURNBULL, *Practical Essay*, 4to., London, 1841; and *Cast iron columns*, 1832, p. 136. KIRKALDY, *Use and Application*, 8vo., London, 1866, 2nd edit., 100; 201. FRANCIS, *Strength of Cast Iron Pillars*, 8vo., New York, 1865. SHIELDS, *On Iron Construction, with remarks on the strength of Iron Columns and Arches*, read at British Association; printed in BUILDER *Journal*, 1861, xix, 643. The *Engineers', etc., Pocket Book*, 1861, p. 193. OVERMAN, *Mechanics*, 8vo., Phil., 1861, p. 411. GREGORY, *Mathematics for Practical men*, 8vo., London, 1862, p. 379. *Pillars on piles*, in BUILDING NEWS *Journal*, 1870, p. 63. On cast iron columns, B. N. *J.*, iv, 499: B. *J.*, xix, 643, 689; 723; xvi, 531; 786. ARTIZAN *Journal*, 1859, p. 22; 50 ft., 4 ft. 4 in. diam. DALY, *Revue Générale*, xii, 314, etc. Connecting iron columns in tiers, B. *J.*, 1864, 916-7: and B. N. *J.*, 1874, xxvii, 116 and plate.

PILLAR OF VICTORY. The Buddhist *jaya sthamba*, at Chittore, 1439, of 9 stories, 30 ft. wide and 120 ft. high is directly imitated by the Chinese in their pagoda of 9 stories: two *minars* at Ghazni, one by Mahmoud, the other later: with the Roman works, the columna rostrata, the columns at Alexandria, at Arsinoë, at Mylassa in Caria, the two at Rome, and at Cussi near Beaune in France, are mentioned by FERGUSSON, *Handbook*, 8vo., 1855, p. 81, 339-40, and 414. MEMORIAL COLUMN.

PILLAR; STONE; see MAENHIR (Fr. *peulvan*). The curious ancient stone pillar in Wolverhampton churchyard is given in BUILDER *Journal*, 1872, xxx, 787.

PILLAR TEMPLE; see ROUND TOWER: MINAH.

PILLORY (Fr. *pillorie;* and *carcan;* Ger. *pranger*). An instrument of punishment, which as used in the time of king Henry VII may be seen in a print published by the Society of Antiquaries. In modern times it was a frame of wood raised several feet from the ground, and behind it stood the culprit, supported on a platform, his head and arms being stuck through holes in the frame so as to be exposed in front of it. The pillory was abolished 1837, 1 Vict. c. 23. 14.

Near the church end at East Looe, one yet remains; it was claimed by Henry de Bodrigan, lord of the manor in the reign of Edward I; MURRAY, *Handbook to Devon and Cornwall*, edit. 1865, p. 253. NOTES AND QUERIES *Journal*, 4th Ser., i and iv. JEWITT, *Reliquary*, i, 209. A carved one at Cintra is given in TAYLOR, *Voyage en Espagne*, 1826-32.

PILLOW; see BALTEUS; CUSHION: PULVINATION.

PILLOW WORK. The course of stone worked or left rough in the form of a swelling, as seen in the Roman aqueducts and bridges in Spain; and in some friezes of the Italian orders employed in the XVII and XVIII centuries.

PILON (GERMAIN), of Paris, died 1590, was chiefly a sculptor. 5. 14. 20. 68.

PIMENTEL (ANTONIO), chiefly a sculptor, was appointed 20 April 1573 architect to king Philip II of Spain, and advised upon the works at the fortress of Simancas. J. de HERRERA. 66.

PIN. A slender piece of wood used in fastening together various parts of joiner's and other work. In large framing it is called a TRENAIL. DRAW BORE PIN. It is also used in plain tiling. 4.

PINACOTHECA. The Greek term, used by the Germans for PICTURE GALLERY; and sometimes written pinacothek.

PINASTER; see PINUS.

PINAULT (. . . . .) succeeded 1719 to J. B. A. Le Blond at S. Petersburg. PINEAU.

PINCERS. An iron instrument of various forms used for drawing out nails, holding pipes and bars, and other such uses, in the various trades. Pincers are emblems of the sufferings of Saints Lucy, Appolonia, Agatha, Pelagius, Macra, and Galmier.

PINCHBECK. An alloy of copper and zinc in nearly equal parts, used in cheap jewellery and inlaid work.

PINCHON (JEAN), was 1447-59 master mason to the duc de Bourgogne at the château de Hesdin; and 1472 consulted on the restoration of the tower of the church of Notre Dame at Saint Omer. LANCE, *Dict. Biog.*, 1872.

PINE, TO. A term used in the sense of "to shrink"; LOUDON, *Encyc. of Cottage, etc., Arch.*, 8vo., London, 1842, § 990.

PINE APPLE; see PINERY; and PINE CONE.

PINEAU (DOMINIQUE), also a sculptor, was born 2 April 1718 at S. Petersburg, where his father Nicolas was "premier sculpteur du czar Pierre." At Paris he decorated several hotels. He published *Nouveaux dessins d'Autels et de Baldaquins*, fol.; *Décorations pour toutes sortes de Chambres*, fol.; and *Livre de pieds de tables et piédestaux*, fol. Paris, 1756; the date of his death is unknown; LANCE, *Dict.*, 1872. PINAULT.

PINEAU (FRANÇOIS NICOLAS), son of the above, was born 6 February 1746, at Paris. He was appointed 1778 architect to the city of Bordeaux; designed the fountain, &c., at Cognac commemorative of the birth of Francis I; and the tomb to the prince de Condé at Triac. He died 14 May 1823. LANCE, *Dict.*, 1872.

PINE CONE (Fr. *pomme de pin*) sometimes called fir-cone. The fruit of the genus PINUS. "M. Lajard has shown the connection between the cone of the cypress and the worship of Venus in the religious systems of the East; but I hesitate to identify the object held by the winged figures of the Assyrian monuments with the fruit of that tree, or to assign any emblematical meaning to its shape. It has been suggested that, from its inflammable nature, the fir-cone was an apt emblem of fire;" "Bacchus brought his thyrsus, surrounded by the pine or fir cone, from the East;" LAYARD, *Nineveh*, 8vo., Lond., 1849, ii, 471. BARLOW, *On Symbolism*, Royal Inst. of Brit. Archts., *Sessional Papers*, 1859-60: and *Symbolical signification of the Palm tree, the Phœnix, and the Pine Cone*, in BUILDER *Journal*, 1858, xvi, 721.

It was the Etruscan funereal emblem; several alabaster cones, now in the museum at Volterra, must have been used as decorations of the sepulchres, for whenever the plough turns up pines of alabaster, it is a sure proof of a burial ground existing lower down; STARKE, *Travels*, 8vo., Paris, 1833, p. 106. DENNIS, *Etruria*, 8vo., London, 1848, ii, 157, 193, 492. The most noted Roman example of its use was at the mausoleum of Hadrian, at Rome, as shown in a restoration by BARTOLI, *Sepolcri Antichi*: it was of bronze, and is now placed at the end of the upper inner court of the Vatican; *Illustrations*, s. v., Belvedere. WINCKELMANN, *Werke*, 12mo, Donau, 1825-9, v, 85. PERRON. 25.

The single or double fir cone is found in ornaments of the Romanesque period in England. Grandonio's brazen mace, 1202, kept outside the palazzo della communità at Pistoia, is thus terminated.

PINE END to a stair; see PEIND JOINT.

PINE LEAF. The victors at the Isthmian games were crowned by wreaths of pine leaves, PLINY, xv, 10; and as represented in an antique fragment in STUART AND REVETT, *Antiq. of Athens*, i, pl. 2, fig. 1; also note, iii, p. 17, edit. 1827.

PINEROLO (Fr. *Pignerol*). A town near Turin in Piedmont.

It is the see of a bishop; having a modern cathedral dedicated to S. Donato. 14. 28. 50. 96.

PINERY. Usually a low lean-to pit, slightly sunk in the ground and narrow, with nearly a flat roof, and consisting of a nursing house, succession house, and a fruiting house, one warmer than the other. In some cases that part of the roof which is over the path at the back slopes towards the back wall, and is quite opaque. The pit is filled with fermenting bark in which are plunged the pots containing the pines. A pinery of the old style is given in BLONDEL, *Cours*, 8vo., Paris, 1771, v, pl. 82. THOMSON, *Practical Treatise on the culture of the Pine Apple*, 4to., London, 1866, reviewed, with a woodcut, in BUILDER *Journal*, xxiv, 280.

PINE TIMBER. A description of timber imported from America. PINUS. Good pine opens a bright red colour and is very free from knots; it is nearly equal to Baltic fir. Yellow pine is not fit for building purposes, although often adopted for panels, mouldings, and other inside purposes. Canadian timber is frequently cut to the same shape as the Baltic, for the purpose of deception. BREES, *Gloss.* RED, WHITE, and YELLOW, PINE.

PINI (FRANCESCO), with F. Juvara, 1729, much altered the ducal palace, now the palazzo publico at Lucca.

PINI (ERMENEGILDO), born 1739 in Milan; designed before 1770 the parish church of Saregno, in which year he published *Dialoghi sull' architettura*, and gave illustrations of the edifice in reference to cupolas; he also published many works on mineralogy. He died 1825 in Milan. TICOZZI, *Diz.*, 8vo., Milan, 1832, iv, 143. ROVIDA, *Elogio di E. P.*

PINK (Fr. *stil de grain*). A class of pigments of a yellow or greenish yellow color, prepared by precipitating vegetable juices on a white earth, such as chalk, alumina, etc. They are only useful in water and distemper colours. CARNATION. BROWN; DUTCH; ENGLISH; FRENCH; ITALIAN; and ROSE; PINK.

PINK GRANITE; see GRANITE.

PINNACLE, penecle, pinacle, pinicle, and pinnakyll (Hind. *guldista*; It. *pinaculo, aguglia;* Sp. *pinaculo*; Fr. *pinacle, aiguille; clocheton;* Ger. *gipfel, pinnakyl, zimel, fiale*). The pointed finish to a buttress or other vertical abutment of an edifice. It is intended to assist the stability of the abutment by its weight. It is generally square or octangular, but an hexagonal one occurs at Wrexham tower, which is peculiar also; LLOYD WILLIAMS and UNDERWOOD, *Churches of Denbighshire*, fol., 1872. A pinnacle has sometimes CROCKETS up the angles, and is finished by a CROP or FINIAL, usually of foliage; LANCEA. At Milan cathedral the numerous pinnacles are each finished by the figure of a saint. During the Perpendicular period in England, a sort of cupola was introduced, which was sometimes covered with sculpture like scales or net work. An instance occurs of "yryn pykys made for to sette up on ye poynts of ye crossis of ye pynaclys of ye stepyll for ravouns schuld not stonde yer on to soyll ye stepyll goteris with bonys and oyer thyngs, ijs. iiijd."; BOYS, *Sandwich*, 4to., Canterbury, 1792, p. 363.

In the Elizabethan and later period, an obelisk or globe was used as a pinnacle on the angles of monuments; and it likewise occurs on gateways, as at Caius College, Cambridge. Pinnacles are also used on gables of timber buildings, with great diversity of form. HIPKNOB.

Illustrations, pt. iii, 1849-50. KITTOE, *Illustrations*, fol., Calc., 1838, pl. 38. HUNT, *Tudor Architecture*. VIOLLET LE DUC, *Dict.* 1. 17. 19.

The *Ordination of Pinnacles* is the subject of a MS., dated 1486, by M. Roriczer, printed by C. HEIDELOFF, *Die Bauhutte des Mittelalters in Deutschland*, 4to., Nuremberg, 1844; and *Das Buchlein von der fialen Gerechtigkeit*, von A. REICHENSPERGER, 4to., Trier, 1845, which was partly translated with remarks and illustrations by J. W. PAPWORTH, in *Detached Essays*. The remarks by BOISSERÉE on the "pyramidal system of Cologne cathedral based on the equilateral triangle of 60°" are quoted. A cursory mention of the MS. had been given in the *Journal* for 1847, p. 21, of the ARCHÆOLOGICAL INSTITUTE OF GREAT BRITAIN.

PINNING IN. The filling in of the joints in stone walling with small pieces of stone, when the blocks are irregular in shape, or badly squared.

PINNING UP. The driving wedges, usually of tile, slate, or other hard material, in underpinning operations, so as to bring the upper work fully to bear upon that below it.

PINO (MARCO DA) of Siena, also a painter, was a pupil of M. A. Buonnarroti, a disciple of D. Beccafumi, and worked much with D. Ricciarelli; he established himself shortly before 1550 at Naples, where he modernised the church of S. Trinità di palazzo. His chief work was the church and college of the Gesù Vecchio; since 1780 occupied by the university. VASARI, *Lives*, edit., 1851, v, 178. DELLA VALLE, *Lettere Sanesi*, 4to., Ven., 1782-6, iii. 3.

PINO (MATTEO DA), of Siena, chiefly a painter, is generally considered as a pupil of B. Peruzzi. He died subsequent to 1491. TICOZZI, *Diz.*, iii, 339.

PINTELLI (BACCIO); see PONTELLI (B.).

PINTIA. The ancient name of VALLADOLID, in Spain.

PINUS, The PINE (called *furce* in Norway; Fir, Fr. *sapin*). A genus consisting for the most part of timber trees, distinguished from the firs by their leaves, always evergreen and needle-shaped, growing in pairs, threes, four, or fives, surrounded by a membraneous sheath at their base. The following, selected from the *Penny Cyclopædia*, are the best known, either for landscape gardening in England or for timber: CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 63.

DIV. I.—SCALES OF CONES TRUNCATE AT APEX. LEAVES IN PAIRS. SCALES OF CONES SPINELESS AT APEX.

1. P. Sylvestris, Scotch Fir or Common P.—The most hardy and valuable; gives the red wood and yellow deals, according to its colour, of the carpenters. In Scotland it acquires a great size. In commerce called Baltic fir, Riga fir, Memel timber, etc., and red pine of British America and United States.
2. P. Uncinata, Hooked P.—Pyrenees, &c.—Very hardy, and timber very durable.
3. P. Resinosa, or rubra, Red P. and Norway P.—Northern parts of N. America.—Highly estimated for strength and durability. Attains 80 ft. high, 3 ft. diameter. Gives the *red pine* or deal; or yellow pine, from the colour of the bark, of the United States.
4. P. Bruttia, Calabrian P.—Calabria.—Very handsome; timber said to be of excellent quality.
5. P. Pyrenaica, Pyrenean P.—Spanish Pyrenees.—Of excellent quality.
6. P. Pallasina, Pallas P.—Central parts of Crimea.—Resinous and durable, but very knotty.
7. P. Pinea, Stone P.—S. E. parts of Europe and the Levant.—Used in shipbuilding. The pine so prominent in Italian landscapes.
8. P. Austriaca, Black P.—S. Germany.—Valuable but coarse, and said to resist alternate dryness and moisture better than the larch. (ABIES Larix).
9. P. Laricio, Corsican P.—Corsica, Greece, Turkey, and Spain.—Grows faster than any other known species; produces timber similar in quality to red deal, but more brittle and less elastic. Used in France for shipbuilding.

SCALES OF CONES SPINY AT APEX.

10. P. Pinaster, Cluster P.—France and S. Europe.—Gives a soft, light, coarse timber, fit only for very common purposes; affords a large quantity of resin and tar.
11. P. Mitis, Yellow P.—N. America.—Of great value for domestic and naval purposes, but the sap wood must be first removed; regarded as most durable in England. In America it ranks next in quality to P. Australis. Gives the *yellow pine or deal* of United States.

LEAVES IN THREES; SCALES OF CONES SPINELESS AT APEX.

12. P. Sinensis, Chinese P.—China. 13. P. Insignis, Noble P.—California.—Foliage, bright, dense, grass green. 14. P. Canariensis, Canary P.—Teneriffe and Canary.—Very large size, very resinous and durable.

SCALES OF CONES SPINY AT APEX.

15. P. Australis or palustris, Southern P.—Virginia, &c.—Grows 60 to 70 ft. high, and 15 to 18 ins. diam. for two-thirds of the height. Timber of excellent quality, light, clean, and durable; the *yellow pine or deal*; also used for masts; yields abundance of tar.

16. P. Tæda, Frankincense and Loblolly, and White P.—Florida and Virginia.—80 ft.; battens 4 ins. wide; soft and perishable; shrinks, bad for floors, decays rapidly in open air. Yields a fragrant turpentine.
17. P. Rigida, or Nigra, Pitch P.; Virginian P. and Georgian P. of the United States.—Of an unusually knotted structure. Yields tar in abundance.
18. P. Ponderosa, Heavy-wooded P.—N.W. America.—Coarse, heavy, and durable timber.
19. P. Sabiniana, Sabine P.—California.—110 ft. to 140 ft. high, 3 ft. to 12 ft. diam. Timber, white, soft, and not durable.

DIV. II.—SCALES OF CONES FLAT AND COMPRESSED AT THE APEX.

20. P. Cembra, Cembra P.—Siberia, Switzerland, and Italy.—Very ornamental and hardy, grows tolerably fast, and produces a fragrant fine-grained, soft wood, suited for carvers and turners.
21. P. Strobus, Weymouth P.—Canada, Brunswick, and N. America.—Grows very fast; produces the clean, soft, white, but perishable timber imported under the name of "pine", "white pine", or deal of the United States, in logs 15, 16, and 20 ins. square.
22. P. Excelsa, Lofty P.—Himalaya tree.—Habit of the preceding.
23. P. Lambertiana, Lambert P.—New Albion.—200 ft. high and more on sandy plains. Spongy timber, and of no value except for fire wood.
24. P. Ayacahuite, Ayacahuite P.—Mexico and Guatemala.—Gigantic tree, resembling the Weymouth pine in habit; yields a large quantity of clear, bright, amber-colored resin. 14.

P. cedrus is now called ABIES cedrus, Cedar fir; and P. ABIES now ABIES excelsa or communis, Norway spruce fir. P. larix now ABIES larix, or Larch fir. P. picea now ABIES picea, or Silver fir. AURACARIA. DAMMARA. LEIRIA. PHYLLOCLADUS. P. cupressoides is mentioned in G. de PRANGEY, *Arch. des Arabes*, 1841, p. 126, as the wood used in Spain for ceilings and doors; the THUJA articulata; and Sp. *Alerce*. ALHAMBRA.

SILLOWAY, *Text Book of Modern Carpentry*, 4to., Boston, U.S., 1858. TREDGOLD, *Carpentry*; NEWLANDS, *Carpentry*; GWILT, *Encycl.*, 1867. LOUDON, *Arboretum, etc., Britt.*, iv. LAMBERT, *Monograph of the genus Pinus*, 98 or 101 pl., fol., Lond., 1828-37. ARCHER, *Pop. Econ. Botany*, 8vo., London, 1853. LAWSON, *Pinetum Britannicum*, fol., Edinb., 1866-75. LASLETT, *Timber and Timber Trees*, 8vo., Lond., 1875. MICHAUX, *N. American Sylva*, 3rd edit., 4to., Phil., 1871, iii. SLEIGH, *Pine Forests and Hacmatack clearings*, 8vo., 1853. MONTEATH, *Forester's Guide*, p. 230. PENNY MAGAZINE, 1843, xii, 18, 27, and 42. SENILIS, *Pinaceæ; Handbook of the Firs and Pines*, 8vo., 1866. 71.

STEVENSON, *Building Materials of the United States of North America*, read before Society of Arts for Scotland, 1841; printed in CIVIL ENGINEER, ETC., *Journal*, iv, 267-8. *Report* from the Select Committee on *Timber duties*, fol., London, 1835, and *On qualities of Timber and Deals*, by G. Bailey, *idem Journal*, vi, 1843, p. 405; 432. HOLTZAPFFEL, *Catalogue of Woods*, 8vo., London, 1843, p. 100. The Crystal Palace collection of British and Foreign Woods; in BUILDING NEWS *Journal*, 1859, v, 667-9. *Pines and Spruce Firs of the United States*, etc.; *idem*, 1874, xxvii, 488; 547. BRITTEN, *On Timber and Deals*; in CIVIL ENGINEER, ETC., *Journal*, 1866, xxix, 27-32. SEDDON, *Notes on the Building Trades*, fol., Chatham, 1873.

BALTIC TIMBER. CHRISTIANIA DEALS. FIR. DEAL. RED DEAL OR PINE. YELLOW DEAL OR PINE. WHITE DEAL OR PINE. PITCH PINE. CANADIAN TIMBER. NORWEGIAN ARCHITECTURE and TIMBER. MARK OR BRAND. TAR and PITCH.

PIOPPA (GIOVANNI FRANCESCO), a clever architect of Modena, died 28 Oct. 1662 (?) aged 65 years. 35.

PIPE. A hollow roll of metal or other material, sometimes called a tube. Pipes are either socket, flanged or flanched, or screwed; in measuring the former the socket is excluded. Pipes above 4 ins. are all cast 9 ft. long, and under 4 ins. down to 1½ ins. are usually 6 ft. long, and 1½ ins. are 4½ ft. long. The names *main* and *sub-main* are given to leading pipes from 4 ins. to 18 ins. diam., and *service pipe* for smaller diameters. The iron pipes are generally proved by hydraulic pressure equal to a column of water 250 ft. high.

The thickness to be given to a cylindrical pipe exposed to a certain internal pressure is usually as follows:—$x = \frac{pr}{c-1}$, in which p = the pressure per square inch, r = the radius of the internal diameter; and c = the cohesive strength of the metal per square inch; HAWKSLEY makes the thickness of *cast iron* pipes = 0.18 $\sqrt{d}$, or in other words he makes it equal to one-fifth of the square root of the diameter. *G. R. B.

A lead pipe was formerly made by bending the lead round a core and then soldering the joint. Drawn lead pipes of every diameter without soldering were known 1823 in France. The process of drawing lead or composition pipes is by a cylinder about 5 ins. diam., fitted with a plunger driven by a hydraulic press working many tons per square inch, and filled with molten metal; the cylinder is refilled with metal as often as wanted, to make any length of pipe necessary. As soon as the lead cools into a solid mass, it is forced through an orifice in the bottom of the cylinder corresponding to the size of the pipe desired. To form the tube, a short piece of iron rod answering to the intended bore, and supported by a tripod, is fixed in the centre of the cylinder; the metal, separating to pass these legs, unites before issuing from the orifice. As fast as the pipe is made it is wound on a large drum to cool; and then on smaller wheels to be shifted off in coils. The larger diameters cannot be coiled; they are made in 10 ft. lengths, descending into a well beneath the machine. Thirty-seven sizes are manufactured, of which the following are the chief weights: In long lengths, ⅛ in. 3 to 4 lbs. per yard; ¾ in., 4 to 8 lbs.; 1 in., 7 to 11 lbs.; 2 ins., 21 to 28 lbs.; 4 ins., 15 lbs. per foot, or for soil pipes 5½ lbs. per foot, run in 10 ft. lengths. Such machines are illustrated in CIVIL ENGINEER, ETC., *Journal*, 1849, xii, 280; in ENGINEER *Journal*, 1859, Dec. 30; and the old method in CRESY, *Encyc. of Civil Engineering*, p. 668. In the 1851 Exhibition, held in London, Egger of Villach, produced a drawn pipe 1800 ft. long, perfectly cylindrical (71). J. T.

Pipes made from ductile materials, as brass, copper, and tin, are first cast into an ingot having a tapered end, with a hole through its length of slightly larger diameter than the *bore* of the pipe is to have. Into this is placed an iron rod, called a mandrel, slightly projecting at the tapered end. It is then taken to the "drawing table", placed in a funnel shaped hole formed in a steel post, the end gripped by pincers, which, worked by machine power, draws the soft metal and mandrel through, this process being repeated several times through diminishing sized dies, until the length of pipe is complete. All metals require to be thus repeatedly drawn through holes, and have to be softened or annealed at intervals.

Pipes are also made from copper, brass, and malleable iron. The strips for *copper* pipes are usually turned round roughly into the shape of the pipe by drawing through conical shaped dies, the edges having been previously thinned; or sometimes the thinning of the edges is done during the process of shaping by drawing under knives or cutters. After the copper pipes are brazed, they require to be drawn through dies for shaping and hardening. Com from Messrs. Pontifex and Wood.

There are two modes of welding *iron* tubes. The *buttwelded* process is applicable to gas, steam, and other tubes up to 2 in. diameter. Under this process the strip is heated in an ordinary furnace to a red heat, and then drawn through dies into a circular shape. The skelp, or unwelded tube, in this condition is then placed into a welding furnace, and when sufficiently heated for welding it is gripped by a pair of strong pliers, which are acted upon by an endless chain, which is driven by the engine or other motive power; at the same time as the skelp or tube is gripped by the pliers, a pair of tongs or circular dies grip the skelp immediately in front of the furnace, which compresses the two edges of the strip together in a welding condition, and thus forms the tube. The tube is then again placed in the furnace, and another pair of tongs or dies of smaller diameter are used. This operation, repeated three times, completes the welding of the tube. The *lapwelded* process applies to boiler tubes of various descriptions, and other tubes above 2 in. diameter used for different purposes. The first operation connected with the strips

is to draw them through a scarfing machine, which bevels the edges, so that when bent in the circle the two edges form a lap joint. To do this the strip is placed in a furnace and heated to a red heat: it is then drawn through curvilinear skelping dies by means of an endless chain and draw bench, as described in the former process. The skelp is then passed to the welding furnace, and on being sufficiently heated is drawn from thence and passed through a pair of quick revolving welding rolls, over an internal cast iron mandrel, or plug, which is held in the centre of the rolls by a long stem, resisted at its opposite end. The tube is then removed from the rod or stem and placed in the furnace again; when sufficiently hot the operation is repeated and the tube is perfectly welded.—Com. from Messrs. James Russell and Sons, Limited, Wednesbury. CHAMBERS'S ENCYCLOPÆDIA, 1874.

A flexible mandrel for bending metal pipes is noticed in BUILDER *Journal*, 1875, xxxiii, 1001.

Copper pipe. Some of the seamless tubes or pipes made ostensibly from copper, appear to be formed of an alloy: pure copper in its melted state has a pudding-like consistency, and when cast is likely to come out unsound. At New York, however, it is stated that *pure* copper is cast into sound tubular ingots or tubes by running the fluid metal into moulds revolving some 2,000 times per minute, forming seamless copper tubes. A measured quantity of metal is poured successively into the end of each mould, the result being a tubular ingot of say 1 ft. long 4½ ins. diameter, with a cylindrical bore of about 3 ins. This, when cold, is heated and rolled out to a length of 2 ft., and the process is repeated until a length of 3 ft. or 4 ft. is attained. After annealing it is drawn successively through dies of gradually diminishing size.

Muntz's solid *brass pipes* or tubes. Brass tube is made from $\frac{1}{8}\frac{1}{8}$ of an inch to 6 ins. diam., the thickness being so graduated that all the sizes can be placed one within another; also a rope-tube for gas which tears less readily than jointed tubes. 71.

Tinned lead pipe, and *lead encased block tin pipe;* see TIN PIPE.

Iron pipe. Lambert's patent welded *wrought iron tubes* and fittings, 1862, for gas or low pressure steam, or water, made from ⅛th to 4 in. bores; for high pressure steam or water, proved to a pressure of 200 lbs. per sq. in. The ordinary gas pipe is proved to 75 lbs.

"Patent indestructible *enamelled* wrought iron lap-welded pipe", made from ½ in. to 15 in. diam., for gas, water, sewage, and mining, the joints connected by a "patent sleeve coupling" preventing all leakage.

Pipes for Perkins' high temperature system are usually inch diam., about ⅝ths inside, and 1¼ in., or nearly ⅞ths inside. They are said to be proved to 3,000 lbs. per square inch; HEAT, *Detached Essay*, p. 19. For the usual low temperature system, the pipes are from 2 ins. to 4 ins. diam. FAIRBAIRN, *on the Resistance of Iron Tubes to Collapse* (in boilers); experiments for the Royal Society: recorded in CIVIL ENGINEER, etc., *Journal*, 1857, xx, 356. Strength of pipes, *Proceedings* of Inst. of Civil Engineers, xii, 59. HURST, *Pocket-book*, p. 73. TEMPLETON, *Workshop Companion*, p. 112. BUCHANAN, *Millwork*, 8vo., London, 1841, p. 226. *Iron versus Lead Pipes*, BUILDING NEWS *Journal*, 1871, xxi, 97. COMBUSTION. IGNITION. POROSITY. HYDRAULICS, (p. 105). HOT AIR. FLUE.

The *weights* of lead, wrought iron, and copper pipes, are given in OVERMAN, *Mechanics*, 12mo., Phil., 1861, p. 415: and of cast iron, in the "Pocket books" and "Price books": of these and others, in MOLESWORTH, and in HURST, *Handbooks*: also in BREES, *Glossary*, p. 311. 1.

Paper pipe. A bitumenised paper pipe (a French patent) for water, gas, and drainage, was stated to have great strength and durability, and perfect inoxidability; to be a non-conductor; only a quarter of the weight of iron pipes; proved to 220 lbs. per square inch, equal to 500 ft. head of water; and made in 7 ft. lengths; CIVIL ENGINEER, etc., *Journal*, 1860, xxiii, 316. DUBLIN BUILDER *Journal*, 1859, i, 63; and BUILDER *Journal*, 1859, xvii, 384; 1860, xviii, 95. In Switzerland, the paper was eaten by insects. In 1865 the use of paper pipes is noticed in France, Germany, and England, with various results; MECHANIC'S MAGAZINE, and BUILDING NEWS *Journal*, xii, 555. A pipe of coarse brown paper, was made at a factory at Bow soon after the Excise duty on paper was removed. The paper was dipped in tar, etc., and then rolled round a circular core. The pipes bore an enormous pressure of water, but the manufacture was given up owing to the difficulty of making water-tight joints. Mechi put some down a few years before 1866, which proved a failure as they collapsed, and became soft in a clay soil. BUILDER *Journal*, 1866, 31 March.

Slate and asphalte pipe is noticed in BUILDER *Journal*, 1855, xiii, 437. Sebille of Nantes, 1862, showed pipes of three parts of finely-ground slate, and one part of tar: also of coarse sand and pitch and cinders for pipes conveying acids.

Glass pipe for aqueous or aeriform fluids, joined by W. Mayo's patent joints (patented Aug. 21, 1850). *Practical Mechanic's Journal*, iii, 179. GLASS, p. 48a. Glass, water, and gas mains, up to 8 in. bore, were introduced, 1844, by Bergeron of Rive de Gier. CIVIL ENGINEER *Journal*, 1844, vii, 11, from the *Bulletin du Musée de l'Industrie.* 71.

SERVICE PIPE. SOIL PIPE. SUPPLY PIPE. STOVE PIPE. SMOKE FLUE. FLUE (EARTHENWARE). CHIMNEY. RAIN-WATER PIPE. SPEAKING PIPE OR TUBE. WATER PIPE. WASTE PIPE.

PIPE BOARD; see CLAPBOARD.

PIPE CASING. When of wood, it is wrought and framed, and put up inside the house to hide lead or other pipes. The fronts should be screwed or hinged, for easier access to the pipe in case of defects.

PIPE CLAY. A material used in modelling by sculptors and others. CLAY.

PIPE DRAIN; see EARTHENWARE. DRAIN PIPE. STONEWARE. SEWER. SEWER PIPE.

PIPE DRAINAGE. A system of drainage of houses advocated from about 1840, causing the manufacture of earthenware, and then stoneware, pipe drains to replace brick drains; and then pipe sewers ensued. The early volumes of the BUILDER *Journal* may be referred to for its history.

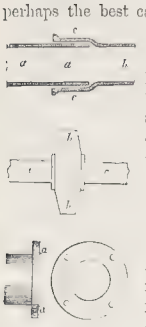
Minutes of Information for drainage, ascertained by Roe in the Holborn and Finsbury division of sewers, given, with other information on the subject, in BUILDER *Journal*, 1852, x, 651. *Size of pipes for combined back drainage* at Swansea, BUILDER *Journal*, 1860, xviii, 764. BAZALGETTE, *Drainage, and Water Supply*, etc., 8vo., London, 1854, and other works; those by DEMPSEY; and RAWLINSON. LATHAM, *Sanitary Engineering, a Guide to the Construction of Works of Sewerage and House Drainage, with Tables, etc.*, 8vo., London, 1873. WOOLRYCH, *Law of Sewers; Drainage Acts*, 2nd edit., 8vo., London, 1849.

GENERAL BOARD OF HEALTH, *Minutes of Information* collected with reference to works for the *removal of soil water* and drainage of dwelling houses and public edifices, and for the sewerage and drainage of the sites of Towns, 8vo., London, 1852. *Minutes of Information* collected in respect of the *Drainage of the Land* forming the Sites of Towns, to Road Drainage, and the facilities of the Drainage of Suburban Lands, 8vo., London, 1852. *Communication* from the General Board of Health, and *Reports* from Superintending Inspectors of the Board made to the Secretary of State, in relation to the Reports of the Engineers of the Metropolitan Sewers Commission in respect of the Operation of *Pipe Sewers*, 8vo., London, 1855.

PIPE FURNACE FOR HOT AIR; see HEAT, *Detached Essay*, p. 9.

PIPE JOINT. The modes of joining metal pipes are numerous: the simplest is the flange joint; and a ring of vulcanised indiarubber, being screwed up tightly between them, will make a good hot water or steam-tight joint. The faucet joint is most frequently used; and when carefully rusted, it is

perhaps the best can be adopted, though not so simple as the



flange joint. The end *a a*, of one pipe is passed into the socket *c c*, of the other pipe *b*. "Iron cement" is the best wherewith to make good these joints; the composition is forced between the joints with a caulking chisel and hammer: sulphur, often used in addition, produces disastrous effects on the iron and on any painter's work. Wicksteed's experiments on the application of wooden wedges to secure the joints of water pipes, are recorded in the Society of Arts *Transactions*, 1838, li, pt. 2; reprinted in Civil Engineer *Journal*, i, 241-3. Building News *Journal*, 1871, xx, 185-6. Another clean and efficient method of joining pipes is effected by the face of the flange being turned truly flat; a small groove, as shown by the dotted line in the figure is cut therein, and a piece of iron wire let into it as at *a a*; a corresponding groove is formed in the other flange: when the two are screwed together, the wire keeps the joint remarkably tight. In count Rumford's expansion drum-joint *b b* is a drum of thin copper, of sufficient breadth to allow the requisite degree of expansion in the pipes, so that they can draw out or compress the sides without injury; *c c* represent the pipes joined to the sides of the drum in a state of tension. The composition pipes used for gas, and for conveyance of sound, have the joints soldered. Gas, p. 16. Stoneware. Brees, *Glossary*, 1853.

PIPELS (Jan), born at Bois le Duc, flourished about 1526, where he added a timber spire with battlements to the church of S. John. It was 300 ft. high, and was burnt with the west part of the church in 1585. 24.

PIPER, meister, built 1582-93, the intricate groined-vaulting of the middle aile of the church and refectory at Oliva, in Prussia. 92.

PIPERNO, piperigno, and piperino. A trachytic breccia; a dark ferruginated volcanic tufo. It derives its name from Privernum, now Piperno, in the Papal States, where, and at Marino, and the village of Pianura, near Naples, it is excavated, and still used for paving stones, doorsteps, and building purposes, at Rome and Naples. Among the former uses of it, are the walls of Volterra and Fiesole; when compact it was used for sculpture; the pre-Greek tombs at Cumæ, and the later Stabo-Greek tombs; the sarcophagus, Doric with dentils, of C. L. Scipio Barbatus, a.u.c. 455; the columns and entablature of the temple of Manly Fortune at Rome, concealed by stucco, still existing in part; and the roads of all the branches of the Via Appia are paved with it in rectangular blocks, and furrowed transversely. Gunn, *Enquiry*, 8vo., London, 1819, p. 152-4. Valle, *La regia dell' antica Piperno, città nobilissima de' Volsci nel Latio*, 4to., Naples, 1637; 1646. Peperino.

PIPPI (Giulio), commonly called Giulio Romano, born 1492 at Rome, was chiefly a painter, being one of the best of Raffaello's scholars, and a chief assistant under him at the Loggia of the Vatican; the apartment in the Torre Borgia, and the Loggia of Agostino Chigi; he also executed the paintings in the great hall of Constantine in the Vatican. He designed (1520) the vigna de' Medici, now the villa Madama, near Monte Mario at Rome, with the paintings, and the garden decorations; Gruner, *Fresco Decorations*, fol., London, 1844; text, p. 33; Percier et Fontaine, *Maisons de Plaisance*, fol., Paris, 1809, pl. 39-42. In the Vatican, the trumpeters' apartments with the staircase for men and horses (since pulled down): the palazzo on mount Janiculum for Bald. Turini of Pescia, with its decorations: 1515 the pallazzo Gio. Alberini, piazza di Bianchi, afterwards in the Borghese family, (also attributed to R. Sanzio), Ferrerio, *Palazzi*, fol., Rome, 1655, pl. 37-9; Sandrart, *Palat. Roman.*, fol., 1694, ii, pl. 5: the palazzo Cicciaporci, via del Banco di S. Spirito, Letarouilly, *Rome Moderne*, fol., Rome, 1840-57, p. 247, pl. 106: 1535 palazzo for Paul Stagi, piazza Dogana, afterwards Cenci, Ferrerio, pl. 37; Sandrart, iii, pl. 27: a house for himself at the corner of the Macello de' Corbi: the church of Sta. Maria dell' Orto in the Trastevere (the façade by M. Lunghi): and the palazzo, now Lanti, on the Pietro Montorio; the paintings in Piranesi, *Peintures*, etc., fol., Rome, n.d., vol. 24, 16 pl.

In 1524 he went to Mantua, where, availing himself of the old walls, he designed the first hall at entering with the series of apartments on each side, at the palazzo del T, Tè, or The (said to be the short for Tijetto or Theyeto, a canal; but Cellini, *Memoir*, chap. 8, says, "at a place called Alti",) and afterwards, 1525-30, formed it into a palazzo, with a vaulted apartment, 30 ft. diameter, and added the decorations; it was restored 1783, by P. Pozzi. (Mantova). Waring and Macquoid, *Architectural Art*, fol., London, 1850, pl. 49 and 50: plan, etc., in Gruner, *Fresco Decorations*, fol., 1844, copied in the *Handbook*. In the duke Gonzaga's palace at Mantua, Giulio reconstructed many rooms with two very broad spiral staircases; altered and continued by Primaticcio; and another palace for the duke at Marmiruolo, with the decorations, now destroyed. He also designed the decorations at the entry into Mantua, 1530, of the emperor Charles V; for Sigismund in 1550, Bartoli, *Sigismundi Augusti Triumphalis*, fol., Rome, 1670, 26 pl. from Giulio's drawings; and for other entertainments; and for that city made numerous designs for chapels; façades for palaces; gardens; its thorough drainage, etc., and relief from inundations of the river; repaired the church of S. Benedetto of the Cassinesi monks, and rebuilt the dome: a house for himself (restored 1800 for L. Mambrini by P. Pozzi); and opposite to it the palazzo Colleredo, via Larga (carried out by G. B. Ghisi); the palazzo (since rebuilt) for the marchese Torelli, the frescoes in which were published, 1832; the abattoir, and the fish market, the former is given in *Detached Essays*, Abattoir, p. 6, pl. 3: and the *duomo* at Mantua, completed by G. B. Ghisi (Bertani); 1529, the tomb of Balt. Castiglione in the choir of Sta. Maria delle Grazie; and that of Pietro Strozzi in the basilica of Sta. Andrea.

Not long after, he visited Bologna with Tofano Lombardino; made a design in competition for the façade of S. Petronio; was consulted on the proposed exterior to be given to the basilica at Vicenza, Arnaldi *Delle Basil.*, 4to., Vic., 1769, xxxiv-xl: designed the tomb of Claudio Rangoni, count of Castelvetro (died 1537) in Modena cathedral; and that of his mother Lucia Rusca Rangoni; and 1541 was consulted on the works of Milan cathedral. Giulio died at Mantua of fever, 1 Feb. 1546, aged 53 years, and was buried in the church of Sta. Barnaba; the epitaph is given in Vasari, *Vite*. A portrait by himself was in Kensington palace; Pyne, *Royal Residences*. Among his best pupils, besides those already mentioned, were G. B. Pagni of Pescia; F. Primaticcio; Rinaldo and Giovan Battista of Mantua; Gian del Lione; Raf. dal Colle of Borgo; Figurino of Faenza, or Marc Antonio Rocchetti; Giulio Tonduzzi; and Fermo Guisoni; while G. B. Ghisi completed the unfinished edifices.

"The history of Giulio is perhaps unique, for where besides will be found the man, who, after having erected so many grandiose and beautiful buildings, has then painted and adorned them with his own hands"; Lanzi, *Hist. of Painting*, Engl. edit., 1847, ii, 331, who mentions that his son Raphael died aged 30 years. Kugler, *Geschichte der Malerei*, 8vo., Berlin, 1847, 2nd edit.; Platner and Bunsen, *Besch. der Stadt Rom.*, 8vo., and pl., Stutt., 1830-42; Cadioli, *Descr. di Mantova*, etc., 8vo., Mant., 1763; Q. de Quincy, *Vie des Arch.*, 8vo., Paris, 1830; Gaye, *Carteggio*, 8vo., Fir., 1839-40; and his *Beiträgen zur Deutschen Uebersetzung des Vasari*, in *Kunstblatt*, No. 71, 1838; D'Arco, *Vita, etc., di G. R.*, fol., Mant., 1838.

3. 5. 14. 94. 25. 62. 68. 73. 105. 111.

PIQUÉ. A French term used in art for pricked or dotted: inlaid work in the form of small ornaments in metal.

PIRÆUS; see Athens (p. 114); Munychia; and Phalerum. Hippodamas. 28. 50.

PIRAN or Pyran (S.); see Perran Zabulœ; and Altar.

PIRANESI (Giovanni Battista), born (1707, 1713, 1720, on his monument is the date) 1721, at Venice, sent to Rome by his father, a mason, studied the antiquities, and in 1741 published his first work on the *Triumphal Arches*, etc., the plates of which established his reputation for their superior vigour of execution. Within less than forty years he produced nearly 1,000 plates full of detail, in 29 folio volumes, besides many for other publications, such as "*the works*" by R. Adam. Among his few designs in architecture, he repaired or rebuilt the church of Sta. Maria del Popolo (Pintelli); and restored 1765 the church of Sta. Maria Aventina, or il Priorato; wherein he was buried, and where a full-sized statue by Angolini was erected on his decease at Rome, 9 Nov. 1778 (1779 on his monument). A bust by Alessandro d' Este, executed at the cost of Canova, is in the protomoteca of the palace of the Conservatori, at Rome (an etching exists of it). His portrait was engraved by Polanzani, 1750. A list of the books published by Piranesi is given in the "Fine Arts Catalogue of Books", South Kensington Museum: and Quaritch, *General Catalogue*, p. 1379-80. The plates were once nearly lost to the family, as related in Ackermann, *Repository of Arts*, etc., 8vo., London, 1812, viii, 276. Arnold, *Library of the Fine Arts*, 1831, ii, p. 8-13, from a MS. *Memoir* by one of his sons, then in the possession of the editor; an engraving of the statue is also given. A portait by F. Piranesi, and that by Polanzani, is given in the edition of *Le Antichità Romane*, fol., Paris, 1835. Bianconi, *Elogio storico*, in Antologia Romana, 1779, Nos. 34-6; *Œuvres*, 8vo., Milan, 1802, ii; and *l'Album de Rome*, 3 Oct. 1840, with additions. Biagi, *Sull' incisione, etc.*, 8vo., Venice, 1820. Gamba, *Galleria de' letterati, etc., delle provincie Veneziane*, 8vo., Ven., 1822-24. Tipaldo, *Biog. degli Ital. illustri*, ix, 356-66. Gori Gandellini, *Not. degli Intagliatori*.

Of his sons, G. B. Piranesi, also an engraver, died 4 Oct. 1820; Francesco, born 1748 at Rome, went 1798 to Paris; he published plates of architectural views and antique statues, fol., Rome, 1769-92, and died 27 Jan. 1810; and Pietro; and two daughters, one, Laura, born 1750 at Rome, died 1785, who all assisted him; as well as several pupils, as Tommaso Piroli, who died 22 March 1824, at Rome. 11. 14. 25.

PIRATINERA Guianensis; Letter wood, or Snake wood; same as Brosimum.

PIRIS (J. de); see Perier (Jean).

PIRK; see Jerkin head.

PIRNA. A town in the circle of Meissen in Saxony, situated on the river Elbe, over which is a fine stone railway bridge, completed 1876 by Lohmen and Arnsdorf. The fine chief church (Gothic); the Dominican church, founded 1301; S. Kunigunda, consecrated 1823; a handsome school house 1830; and the fortress of Sonnenstein, restored 1814. Engelhardt, *Das Königreich Sachsen*, 7th edit. by von Schlieben. 14. 50.

PIRNA RED SANDSTONE. A fine-grained grit from the banks of the river Elbe. There are numerous quarries adjacent to the town which furnish three sorts of stone: 1, for grindstones; 2, for millstones; and 3, for the sculptor and statuary, which is also exported to England. 14.

PIRRO LIGORIO; see Ligorio (P.).

PISA (the ancient Pisæ; Fr. *Pise*). The capital of Tuscany, situated on the river Arno, which is crossed by the ponte alla fortezza, xv cent.; and the ponte di mezzo, del giuoco, or vecchio 1040, rebuilt of one arch in two years by Bartoletti, but fell 1 January 1644 (eight days after it had been opened); it was then rebuilt of three arches; the ponte a mare was destroyed 1700. An aqueduct from the valle d'Asciano, formed 1606-13, is about 4⅔ miles long, and near the city is 40 ft. high (Aqueduct, *Detached Essay*, p. 12). Very few Roman remains exist: the Baths of Nero, a plain octagon sudatorium; and two large marble Corinthian capitals are embedded in the outer wall of the *archivio del duomo*, formerly the church of Sta. Felice. Witte et Lenormant, *Gazette Arch., Chapitaux romains historiés, dans une maison*, 4to., 1877, pl. 29 and 30. The old wall with its five gates remains nearly in the same state as when defended against the Florentine forces. F. Lapi designed, *cir.* 1420, the old citadel, and gave for the new citadel the design whereby the ponte a mare was closed by two towers. G. San Gallo designed the fortress and the Doric gate of S. Marco near the ponte alla fortezza. The façades of three houses of xii and xiii centuries are shown in Verdier et Cattois, *Arch. Civile, etc.*, 4to., Paris, 1857, ii, 215. No. 698 on the Lungo l'Arno is a very old and singular edifice.

Pisa is the see of an archbishopric. "The duomo, baptistery, campanile, and campo santo, form a group of buildings of more curiosity than any four edifices in the world"; Gwilt, *Encycl.*, 1876. The *duomo*, dedicated to the Virgin ("the glory of the Romanesque," Freeman, *Hist. Sketches*, 1876, p. 113) was begun 1063, completed 1067, 1092, or 1110, and consecrated 1118, but little now exists of this work. It orientates correctly, and has five aisles, with three to the transepts. The name Busketus is inscribed on the marble façade, and his tomb is in the edifice; Rainaldus is inscribed near the chief portal; and the registers state that Udibrando del Giudice was directing architect over those two named (Cicognara, *Storia*, fol., Venice, 1818, i, 178-83). Many details of antiquity are worked in; the Pisans are stated to have carried off shiploads of sculpture and marble from Carthage, to decorate 1063 their cathedral; Falbe, *Recherches sur l'Emplacement de Carth.*, p. 12. The eastern apse dates 1202. A fire, caused by plumbers, in the night of 24 Oct. 1594 (Anguillesi, *Not. Storiche*, 8vo., Pisa, 1815, who p. 27-29 gives an account of the subsequent expenses), 25 Oct. 1595 (Moroni), or 15 Oct. 1596 (*Handbook*), destroyed the dome, vaulting, and clerestory, of the nave. Pointed arches were inserted 1602 to support the elliptical dome. The nave lengthened one quarter; the west front of xiii century (cir. 1250), 116 ft. long and 112 ft. 3 ins. to the apex of the roof, was thoroughly restored between 1845 and 1878. The edifice stands on a platform raised by six steps above the ground. The only bronze door 1180 saved from the fire now leads to the transept (it formerly fronted the bell tower); it is by Bonanno of Pisa (Door, p. 54; Cicognara, i, 184); electrotype copies are now in the South Kensington Museum. The present bronze doors, 1596-1601, are by G. da Bologna; and cast by D. Portigiani (Marchese, *Lives*, 8vo., Dublin, 1852, ii, 289); *Le tre porte di bronzo che adornano la facciata dell' insigne Primaziale da Pisa*, 4 pl. by Rossi, fol., Pisa, 1838. Some portions of the original pulpit 1302-11 by Giov. Pisano, saved from the fire, are now in the campo santo; others were used in the present pulpit, designed 1607 by a Frenchman (Vasari, *Vite*, Flor. edit. 1846, i, 277). The high altar by Rimualdus Pisano was removed for a new rich cinque cento altar dating 1774; its front was rebuilt 1825. The design of the twelve altars is attributed to M. A. Buonarroti, after 1500, and executed by A. Stagi of Pietra Santa, who did many other works in the edifice. The choir stalls are of rich intarsiatura work; Waring, *Arts connected with Arch.*, fol., London, 1858, pl. 18-9. The partly bronze tomb of archbishop Rinuccini, died 1582, is by Tacca. It is about 311 ft. long. View in Knight, *Eccles. Arch.*, fol., London, 1842, i. Hübsch, *Alt. Christl.*, fol., 1858, p. 114, pl. 53, fig. 16, and pl. 54, fig. 14-6. Leclère, *Recueil*, fol., Paris, 1826, pl. 23, has a good plan by Tourrié: also in Rupp, *Chiesa princ. d'Europa*, fol., Mil., 1824-31. *The Architecture of Pisa*, in Builder *Journal*, 1846, iv, 375. Parker, *Cath. of Pisa, and Notes upon Pisan Churches*, in Archæological Journal, 1878. Altar (p. 47).

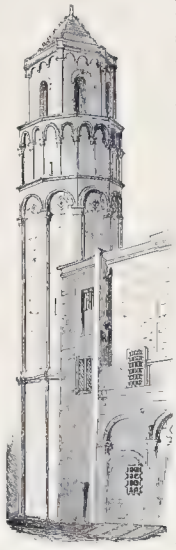
The *campanile*, usually called the "leaning" or "twisted" tower from its overhanging 13 ft., was commenced Aug. 1174, according to an inscription at its base, by Bonannus of Pisa (but Nagler says he after 1233 finished the tower), and Guglielmo Tedesco or Wilhelmus of Innsbruck sometime between 1186-1233. It is 53 ft. diameter at the base, and 178 ft. high, with 294 steps; the eighth story was added by Tommaso Pisano, about 1350 according to Grassi, 1836, ii, 92. It had been restored up to the belfry in 1878. Torre, *Cenno Storico—sur la*

pendenza del camp., 8vo., 1838. Rohault de Fleury, *Camp.*, fol., Paris, 1859.

The *baptistery*, dedicated to S. Giovanni, was commenced 1153 by Diotisalvi (the inscriptions are given s. v. Petroni), resumed above the lower story 1278, and perhaps not completed before the end of xiv century (Smirke; Willis). The edifice is of Carrara marble, repaired 1845-54. The covering is of brick, and consists of an inner conical dome, the outer one being hemispherical, supported on eight columns of Sardinian granite, 3 ft. diameter (Tappen, *Prof. Observations*, 8vo., London, 1806, p. 70); it is 99 ft. diameter internally; an aisle passes all round it. The whole stands upon an outside raised marble platform. The floor is of Alexandrinum opus work in front of the altar, other parts of marble tomb figures of xiv and xv centuries. The large *pergamo* by N. Pisano has the date 1260 in an inscription; a plaster cast of the pulpit is in the South Kensington Museum. Gailhabaud, *Mons.*, ii. Builder *Journal*, 1846, iv, 409. Gunn, *Enquiry*, 8vo., London, 1819, p. 228, stated that the original drawings of this and another edifice existed in the Archives; and in Archæologia, 1822, xx, 1824, p. 537-9, explained how the statement could not be authenticated. The *campo santo*, founded 1108-78, was rebuilt from 1278 by Giov. Pisano (nearly completed 1283 by Aretino, Webb, 359 must be an error), other portions and the tracery completed 1463. It has three courts, and is 415 ft. 6 ins. by 137 ft. 10 ins. and 46 ft. high; the walk is 34 ft. 6 ins. wide. The cappella degli Ammanati was completed *cir.* 1350 by Tommaso Pisano; the cappella maggiore on the east side dates 1594. The roof of the south side was rebuilt 1826. The edifice contains Roman sarcophagi used as modern tombs; about 600 slabs over graves; and a collection of fragments from edifices in the town, including the bronze griffin from the pinnacle of the duomo, an Arabian work: the walls are covered with frescoes. Grandjean et Famin, *Arch. Toscane*, fol., Paris, 1846, pl. 108-9. Smirke, in *Archæologia*, 1806, xv, 363-79, and xxiii, p. 5. Rosini, *Lettere pittoriche*, 4to., Pisa, 1810; *Storia della Pittura Ital.*, fol., 1839-54; 1848-54; his *Descr. delle Pitture*, Pisa, 1816; Lasinio, *Pitture a Fresco*, fol., Flor., 1812; and his *Raccolta di Sarcofagi*, etc., fol., Pisa, 1814 and 1820. Calendar.

The most noted of the churches comprise:—

Sta. Caterina, Dominican; begun about 1252 by G. Agnelli (not by N. Pisano), is a Gothic adaptation of the duomo; it consists of a long single nave with transepts. Front in Builder *Journal*, 1854, xii, 127. The altar tomb of archbishop S. Saltarelli, died 1340, is by Nino Pisano. *S. Francesco* 1252-72 (Pointed) has a single nave 57 ft. 6 ins. wide: the cloisters are richly decorated; and it has a lofty campanile. *S. Frediano*, founded 1077, of which date a portion is probably unaltered; the façade, its chief interest, has antique fragments and columns, and a Romanesque frieze with Runic knots. *Sta. Maria della Spina*, a rectangular chapel of white marble (Italian pointed Gothic). It was first erected 1230 by N. Pisano, statues by Giov. Pisano; and rebuilt after 1323, of which period is the "sham xiv century east end" (Webb). It was much damaged 1871 by a flood and by fire, and was restored and re-erected on a somewhat different site and level; Knight, *Eccles. Arch.*, fol., Lond., 1842-4, ii; Rohault, pl. 38; Shaw, *Arch. Sketches*, fol., 1858, pl. 60-61. *S. Matteo* (Italian pointed), partly altered; the monastery has a fine Pointed cloister. *S. Michele in Borgo*, Camaldolese; crypt xi cent. was painted with emblems; the church is known to have been completed 1018; "a singular instance of a Romanesque type with pointed details" (Webb, who attributes it to a Buono): it is called a Gothicised copy of the duomo. The interior dates early in xiii century, of which date are the columns; all the remainder is modernised. The façade, if dating 1212, is by N. Pisano; if 1304, is by G. Agnelli, whose name occurs in a long inscription on the façade, given in Morrona, iii, c. 6, p. 1. *S. Nicola*, Benedictine; founded about 1000, has often been renewed; the leaning campanile (early true Pointed) cir. 1270, by N. Pisano, is an unperforated octagon for two stories, and surmounted by a pyramid; a staircase therein round a central well formed by marble columns and arches (Morrona, ii), according to Vasari afforded suggestions to Bramante and to A. (Piccone) da Sangallo. *S. Paolo a Ripa l'Arno*, called *duomo vecchio*, supposed 1078-1100 (or 1195) "a perfect type of Pisan Romanesque" (Webb, p. 364), who adds "it had already adopted the dome, probably in direct imitation of the Byzantine style"); Hubsch, *Alt. Christl.*, etc., fol., 1858, p. 96, pl. 42, fig. 12-4, and dates it end of xi cent.; Morrona gives the date as not earlier than 1100; in the cloister is a small heptagonal building, perhaps a baptistery, and now a chapel. *S. Sepolcro*, 1153-87, by Diotisalvi (the inscription is given s. v. Petroni) for the Knights Templars; is octangular and domical, with an aile and slightly pointed arches; it was restored 1854 for the accademia delle belle arti by prof. Rossi. A square tower of three stages has the name of Diotisalvi upon it. *S. Sisto*, begun 1089, perhaps by Busketus, has interior antique columns of granite and cipolino, many fluted. *S. Stefano*, conventual; begun 1565 by G. Vasari; the single nave was completed about 1594-6; the façade is by don G. de' Medici, or by B. Buontalenti (Milizia); the high altar 1700 of marbles and gilt bronze is by Foggini. *S. Andrea* is dated 1100; *S. Pietro in vinculis*, 1072, consecrated 1118; and *S. Martino* 1332 (late Italian pointed) is ascribed to A. Pisano; and has a modern façade. *S. Agatha*, cir. 1063; the walls of brick. Webb, *Cont. Ecclesiology*, 1848.



Palazzo Agostino, now a café, brick and Gothic work of xv century. The former palazzo reale, by Buontalenti, is described in Anguillesi, p. 139-190. Pal. Lanfreducci, now Uppezzinghi, xvi century, by C. Pagliani, not Buonarroti, to whom is better attributed the pal. Lanfranchi, now Toscanelli. Pal. del commune, or custom house, formerly the pal. Gamba-Corti. Pal. pretoria, having on the first floor the accademia delle belle arti, founded 1812 by Napoleon I. Pal. conventuale of the order of S. Stefano, now a school (on the site of the pal. degli Anziani, 1230-33 by N. Pisano) by G. Vasari; the sgraffito work on the façade by Forzori. Pal. del consiglio del ordine, of marble, by Francavilla; pal. of brick with pointed arch windows, now used as the civile stanze.

The *sapienza* was enlarged 1493 and again 1549. Loggie di banchi 1605 by B. Buontalenti, is now a corn market. Torre Guelfa or torre dei Sforzati, now a prison, also formed part of the arsenal, in which other vestiges of the edifices of the age of the republic may be seen. Large warehouse for carriages, in Leclère, *Recueil*, fol., Paris, 1826, pl. 38 drawn by Thiebert. Custom house, near Pisa, 1629 by Santi; Grandjean et Famin, *Arch. Toscane*, 1806, pl. 107. In the piazza di cavalieri is a fountain with fish monsters by Francavilla; and the statue of Cosimo I as grand master of the order of S. Stefano, in front of the palace by Francavilla, given 1561 by him to his order. In the piazza di S. Caterina, founded on the site of the church, etc., of S. Lorenzo, is the marble statue 1745 of the grand duke Leopold I, by Pampaloni.

In the neighbourhood are the *cascine* or government dairy farms, lodging some 1500 cows and 200 camels. In the vallé di Calci, is the decorated *certosa*, xvii cent., occupied since 1814 according to the ancient rules, was secularized 1865. S. Pietro in Grado, before 1000, exhibits the Romanesque in a style different from that of the duomo; it was much altered 1790; 15 Greek marble and 11 granite columns are Roman and of different orders; the square brick tower is xii or xiii century; Waring, *Arts connected*

with Arch., fol., London, 1858, pl. 9 gives a fresco; WITTE ET LENORMANT, *Gazette Arch.*, 4to, Paris, 1877, pl. x, gives a "Chapiteau grec". The church of S. Cassiano 1180 is by BIDUINUS.

The Pisan chronology dates a year later than the English. MARTINI, *Theatrum Basilicæ Pisanæ*, fol., Rome, 1705. MORRONA, *Pisa illustrata, nelle arti del disegno*, 12mo., 1750; 1792; 2 vols., 8vo., Leghorn, 1812; and *Pisa Antica e Moderna*, 8vo., Pisa, 1821. GRASSI, *Le Fabbriche principali di P.*, fol., 1830; and *Descrizione storica e artistica di P., etc.*, 8vo., Pisa, 1836-38. ROHAULT DE FLEURY, *Monumens de Pise au Moyen Age*, fol., text 8vo., Paris, 1866. COCCHI, *De' bagni di Pisa*, 4to., 1750. BIANCHI, *De' bagni di Pisa*, etc. 4to., Fir., 1757. PALLONI, *Chiese Antiche di P.*, 8vo., 1835. CIAMPI, *Inscrizioni Pisane*, 8vo., 1812, and other tracts. TEMPESTI, *Anteperistasi Pisane*, 8vo., Pisa, 1812. *Les grands Edifices de Pise*, 40 pl., fol., Paris, 1878. *Descr. della città di Pisa*, 8vo., Pisa, 1792. *Nuova Guida per la città di P.*, 8vo., Pisa, 1833. *Prodomo delle antiche Arte Pisane ed elogio di Giunta*, 4to., Pisa, 1790. GAYE, *Carteggio Inedite*, 8vo., Flor., 1840. CORDERO, *Dell' Italiana Archit.*, 8vo., Brescia, 1829. LE MOYEN AGE PITTORESQUE.

SMIRKE, *Remains of Gothic Arch. in Italy, etc.*, in ARCHÆOLOGIA, 1806, xv, 364. TAYLOR, *On the Gothic Ornaments of the Duomo*, etc., 1822, xx, 1824, p. 537-52. SMIRKE, *Sepulchral Monument*, 1359, *in the Campo Santo*, 1831, xxiii, 1. WOODS, *Letters*, 4to., London, 1828, ii, 393-8. *Arab Art at Pisa, etc., in* XIII *cent.*, in BUILDING NEWS *Journal*, 1858, iv, 32. *Roman, Romanesque and Gothic Arch. of Italy*, in BUILDER *Journal*, 1846, iv, 398. *Anecdotes à propos de Pise*, in DALY, *Revue générale*, 1842, iii, 241; 289. ECCLESIOLOGIST *Journal*, 1868; reprinted in B. N. *J.*, 1869, xvi, 27. FREEMAN, *Historical Sketches*, 8vo., Lond., 1876. *Illustrations;* Tomb, pl. 39. LION. 14. 28. 50. 96.

PISAC. A town in the valley of Yucay in Peru. The great mountain fortress of Pisac—its forts within forts, its isolated buildings, villages, its temple—was impregnable and self-sustaining.—The perilous path, fortifications, and rock-cut tombs are described in SQUIER, *Incidents*, 8vo., London, 1877, p. 517-32.

PISALIS; see COMMON HOUSE.

PISANELLI (LORENZO) of Bologna, was a clever pupil of C. Baglioni. 5.

PISANI (baron PIETRO), gave the design 1825 for the casa de' Matti or lunatic asylum at Palermo; either on the plan of an old Roman villa, or from the asylum at Aversa. He died 1837 aged 73 years.

The following names are placed in order of dates:—

PISANO (RAINALDUS), is mentioned in an inscription on the façade of the duomo 1063-1092 at Pisa, as "prudens operarius et ipse magister constituit mire solerter et ingeniose". BUSCHETTUS. RAMÉE, *Hist. de l'Arch.*, 12mo., Paris, 1843, ii, 88. PISA.

PISANO (RIMUALDUS), made the altar (*? cir.* 1118) of the cathedral now placed in the campo santo at Pisa. 28. 62.

PISANO (BONANNO), begun August 1174 the "leaning tower" at Pisa. INNSBRUCK (W. von). CAMPIONE (B. da). TORRI, *Iscriz. Romane*, 1841, states that at the entrance are fragments of a tombstone on which is the name of Bonanno; he probably laid the foundation, or slightly raised the walls. The first bronze doors 1180 to the cathedral are attributed to him: an inscription is given in CICOGNARA, *Scultura*, fol., Ven., 1813, i, 184 (also 191, and 313); see DOOR (p. 54).

PISANO (BIDUANO), predecessor of NICOLA PISANO; see BIDUANO (magister).

PISANO (NICOLA), born 1205 or 1207, is said to be a son of ser Pietro da Siena, notary. The work ascribed to him by VASARI before 1227-30 has been considered erroneous, and his account of Nicola generally incorrect. He was a sculptor, and studied the ancient bas-reliefs. In 1233 he was at Lucca; 1240 executed in the cathedral at Pistoia the vaulting of the nave and of the epistle side, and perhaps the vaulting of the tribune that his son Giovanni is said to have destroyed 1299 for the present choir; he is also said to have commenced the campanile (TOLOMEI, *Guida*, read the date 1200); the date 1240 for the fabric by Nicola, and 1298 for the vaulting by Giovanni are noticed by WEBB, p. 388. In 1229-36 he was at Siena when the cathedral was lengthened; and designed 1245 a façade, destroyed 1284 for another by his son Giovanni. VASARI states that he designed a church of S. Giovanni, which may be either the baptistery under the choir of the cathedral dated 1243; or the northern transept, which is called the baptistery of S. Giovanni, and dated 1317; or the church to the same saint standing 1297-1315 next to the building now used as the casa dell' opera del duomo: the fact that large sums were spent 1250-9, on the works to the body of the church, is shown by RUMOHR, *Ital. Forsch.*, 8vo., Berl., 1827-31.

The design, at least, of the church of Sta. Maria Glorioso de' Frari at Venice, dated 1250, is ascribed to Nicola, and the campanile begun 1234 (as in ARCHÆOLOGIA, 1806, xv, 377, and plate); but SELVATICO, *Arch. di Venezia*, 8vo., Ven., 1847, p. 98, says not the church, and gives to him the church of S. Antonio at Padua (p. 121) 1255-1307, and its campanile, or 1231 as in an inscription given in ROSSETTI, *Padua*, 12mo., Padua, 1780, p. 32. At Florence he erected the (Misericordia vecchia) chiesa della Misericordia, of which two arches were remaining 1869 in the ospedale del Bigallo; he destroyed for the Ghibellines the torre del Guardamorte; and he designed 1250 the chiesa di Sta. Trinità, with five aisles, called "La dama" by Michael Angelo. At Arezzo he is said to have designed 1250 the church of S. Domenico with its monastery (but 1286 or 1294 by Maglione); went 1254 to Volterra to enlarge the cathedral: and probably 1252 commenced the Dominican church of Sta. Caterina at Pisa, completed by Agnelli; erected the palazzo degli Anziani, where he used piling; and designed the "leaning tower" to the church of S. Nicola (woodcut, s. v. Pisa; and WARING AND MACQUOID, *Arch. Art*, fol., 1850, pl. 9) with a circular staircase, imitated by Lazzari, and by A. (Piccone) da San Gallo. The date of 1260 in the inscription, only given in the 1846 edition of VASARI, on the gospel ambo in the baptistery of S. Giovanni fixes his employment there (ZERFFI, *On a Cast of the Pulpit in the South Kensington Museum*, in BUILDING NEWS *Journal*, 1873, xxv, 305-6); he might have been engaged about 1262 on the Camaldolese church of S. Michael in Borgo, but if the west front were done 1304 it may be rather ascribed to Guglielmo Agnelli. In the church of S. Domenico at Bologna, the tomb of S. Domenico de Guzman of Calagueraga, in Spain (died 1221, canonized 1234) is dated 1225-31 by VASARI, but is more probably 1265 by Nicola with the help of Agnelli, because the second translation of the body of the saint occurred 5 June 1267.

At Siena, the commission for the octagonal pulpit at the cathedral is dated 29 Sept. 1265, Pisan style (or 1266-7 English), he was assisted by his pupils and his son. *Illustrations*, Pulpit, 1851-2, pt. 3, pl. 93; CIVIL ENGINEER, ETC., *Journal*, 1850, xiii, 65 and plate). His visit to Naples at the request of king Charles I of Anjou, to build the church of S. Lorenzo after the battle 26 Feb. 1266 at Benevento; and the church of Sta. Maria della Vittoria on the plain of Tagliacozzo after the battle of 26 Aug. 1268, seem to be admitted; while the great gate at Naples is by A. Bamboccio, and the cathedral of S. Gennaro 1260-99, or commenced 1272, is attributed to Nicola and to Masuccio I. He sent his pupil Maglione to Naples to conduct the church of S. Lorenzo, finished by Masuccio II; and Nicola restored La Pieve at Cortona; where the Franciscan church of Sta. Margherita is attributed to him, but is dated 1297; a stone of the campanile, however, bears the names of "Nicholaus et Johannes", as in MORRONA, *Pisa*, 8vo., Pisa, 1821, ii, 69; a tomb to Sta. Margherita in the sacristy is ascribed to Nicola in the *Handbook*; another to ... Martelli in the south transept of the church of Sta. Croce at Florence, and also the nunnery of the Donne di Faenza, but it was probably not founded until 1281, and was destroyed 1535; and the operations 1290-97 at the duomo di Sta. Maria at Orvieto.

Nicola is considered to have died about 1278 while engaged

with Giovanni upon the fontana maggiore in the piazza del Commune at Perugia (Vermiglioli, *Del' Acquedetto*, 4to., Per., 1827; and *Le Sculture*, 4to., Per., 1834); also said to be by Guido, a Silvestrine monk. He was perhaps buried in the campo santo at Pisa. His portrait by his son Giovanni exists in one of the small statues on the east side of the chapel of Sta. Maria della Spina at Pisa; *Handbook*, 1846, p. 459. Arnolfo da Cambio was a pupil (Della Valle, *Lettere Sanese*, i, lett. 18; Lanzi, *History*, i, 22, 49): as were also G. Agnelli; and fra Melano Pisano.

Q. de Quincy, *Vies*, 8vo., Paris, 1830, app. Marchese, *Lives*, 8vo., Dublin, 1852, i, 10, 40-46, 63, 67, 73, 81. Antamori, *Storia del duomo di Orvieto*, 4to., Rome, 1781. Selvatico, *Archit.*, 8vo., Venice, 1847, p. 98; 110-1, 121, etc.

Della Valle, *Lettere Sanesi*, 4to., Ven., 1782-86, i, 180, 185. Celano, *Not. di Napoli*, 12mo., Nap., 1692; or 1758, p. 77. Cicognara, *Scultura*, fol., Venice, 1813-18, i, pl. 13-14, 197, 214, and 343-88, 360, for his progenitors. Vermiglioli e Massari, *Le Sculture di N. e G. da Pisa, e di Arnolfo Fiorentino*, 76 pl., fol., Per., 1834. Rohault de Fleury, *Monumens de Pise*, fol., Paris, 1866, text, 8vo. 3. 14. 25. 28. 36. 73. 77. 105.

PISANO (Giovanni). The date of his birth is unknown. He was a son of Nicola, and likewise also a sculptor. Vasari omits all reference to any assistance to his father Nicola; notices a tomb at Perugia, *cir.* 1264, or 1285, or both; and the fontana maggiore there, with Nicola, hearing of whose death, Giov., while at Florence working with others on the mill at S. Gregorio near the piazza de' Mozzi, went to Pisa, where he executed some sculpture, as in the chapel of Sta. Maria della Spina; Felibien attributes the tribune in the duomo to him; he began 1278 the campo santo (nearly finished 1283 by Aretino, in Webb, p. 359, must be an error); Grandjean et Famin, *Arch. Toscane*, fol., Paris, 1846, pl. 108-9. This building was inscribed Joanne magistro Ædificante, mcclxxviii, as in Vasari, who in the next sentence, as in Sigismondo, ii, 343, says that in the same year 1283 Giovanni went to Naples to commence the castel nuovo; as also the curious winding stairs leading to the summit of the campanile to the church therein; (or by G. de Maiano): and where the Franciscan monastery of Sta. Maria della nuova, replacing one destroyed for that fort, is attributed to him, completed by Masuccio I; and rebuilt 1596 by Franco.

Returning to Tuscany, he 1284 at Siena took down his father's façade to the duomo, and commenced one of his own design (Building News *Journal*, 1869, xvi, 65), which was destroyed at the end of xiv cent.: 1286 a marble pulpit in the church of S. Giovanni Evangelista at Pistoia (Webb, 393, but perhaps an error for the holy water basin mentioned below): was employed 1286 on the cathedral at Arezzo: there executed the shrine of S. Donatus on the high altar, also said to have been assisted by Agostino and Angelo da Siena; 1290 the capella degli Ubertini; and several palazzi; besides the church of Sta. Maria de' Servi, soon after in ruins. For pope Boniface VIII (1294-1303), he worked at Rome, Civita Castellana, and Orvieto, and arrived at Florence, where he erected a small front (the later one dates 1370) to the church of Sta. Maria del Fiore; and at Bologna, designed the cappella maggiore, as well as the Borgognoni altar (totally modernized 1724-30) in the church of S. Domenico. Vasari fixes the year 1300 as that at which Giovanni designed the nunnery of S. Nicolo at Prato; and restored the monasteries (not the churches) of S. Domenico at Prato (it was not finished in 1322) and at Pistoia (this latter is dated 1284 in Webb, p. 394): and 1298-1301 the pulpit in the church of S. Andrea at Pistoia; the inscription is given in Tolomei, *Guida;* in Cicognara; and in Morrona.

The tribune by Nicola at the *duomo* at Pistoia was taken down 1299 by Giovanni for a new choir; he finished about 1301 its campanile; and probably executed the *pila* for the holy water basin now placed near the side door of the church of S. Giovanni Evangelista. At Perugia he executed the tomb of pope Benedict XI, died 1304, in the church of S. Domenico (Boarini, *Storia di S. Domenico*, 4to., Per., 1778, p. 15); designed the nave of a new church to that saint, retaining the choir (rebuilt 1624-32 by C. Maderno), and the pulpit in the duomo is attributed to him. His pulpit in the duomo at Pisa occupied him 1302-11, not 1320 as in Vasari; he was assisted by Andrea Pisano; it was destroyed in the fire; some portions with other sculpture are preserved in the museum in the campo santo; *Illustrations, Ecclesiastical Sculpture*, pl. 93; Morrona. At Lucca he was employed in the triforium and vaulting of the duomo, 1308-20 according to Webb, p. 396, but 1311-17 is probably more correct, because in the latter year he was at Prato, erecting the cappella della Cintola in the duomo, enlarging the choir of that edifice, with also a new facing, and commencing the campanile, finished about 1340 by Niccola di Cecco del Mercia and Sano his son (Bianchini, *Sacra Cintola di Maria Vergine*, 8vo., Fir., 1722.

As Giovanni died in 1320, there is some mistake in dating 1323 the portal of the church of S. Paolo at Pistoia, if it were his work. He was buried in the same bay of the campo santo at Pisa as his father, according to Vasari; but on the façade of the archiepiscopal palace at Siena is a tablet inscribed "hoc est sepulcrum magistri Johannis quondam magistri Nicolai et de eius heredibus". The chapel of S. Ranieri in the cathedral at Pisa is attributed to his pupil Lino of Siena, probably in error for Tino di Camaino (Vasari, 1846, iii, 3). 28.

Marchese, *Lives*, 8vo., Dublin, 1852, i, 32, 42, 53, 63, 68, 303: new edition, 1879. Ciampi, *I simboli delle scienze scolpiti da Giov. Pisano*, 8 pl., 8vo., Pisa, 1814; Tolomei, *Guida di Pistoia*, 8vo., Pist., 1821; De Quincy, *Vies*, 8vo., Paris, 1830; Vermiglioli e Massari, *Le Sculture*, etc., 76 pl., fol., Per., 1834; Cicognara, *Scultura*, fol., Venice, 1813-18, i, 193, 360, 361, 379, etc.; Ecclesiologist *Journal*, 1868, xxvi, 316-27.

PISANO (Guglielmo); see Agnelli (frate G.)

PISANO (fra Melano), a Cistercian monk, worked 1265 with Nicola Pisano on the *pergano* of the duomo at Siena; Cicognara, *Scultura*, fol., Ven., 1813, i, 350; and 1271 on the old duomo at Orvieto; and 1291 rebuilt the church of S. Christoforo at Siena; Marchese, *Lives*, 8vo., Dublin, 1852, i, 46.

PISANO (Andrea), born about 1270 (1280 *Penny Cycl.*) at Pontedera, near Pisa, is considered to have been a pupil of Giotto, and chiefly a sculptor. He appears first as assistant to Giovanni Pisano at the cathedral at Pisa. He designed 1306 the castello di S. Barnaba at La Scarperio in Mugello, near Florence; and was engaged 1316-30 on the fortifications of that city, begun 1284 by Arnolfo: designed 1317 the first bronze doors for the church of S. Giovanni, now at the south portal, which were completed 1339; the inscription states "Andreas Ugolini Nini de Pisis me fecit, A.D. 1330", which is now supposed to give the name of his son and the date of the commencement of the casting. The foliage and fruit in the margin are supposed additions by Vittorio di L. Ghiberti. The walls and towers of the arsenal at Venice are considered to be by Andrea, by Selvatico, *Arch. in Venezia*, 8vo., Venice, 1847, p. 111; and that he may have worked at the church of S. Giovanni e Paolo. The church of S. Martino at Pisa, begun 1332; and 1300-37 the octagonal baptistery or church of S. Giovanni at Pistoia, are ascribed to Andrea; at the latter Cellerio di Nese was maestro 1339; yet the body of the beato Atto is only said to have been found 25 Jan. 1337, while trenching for the foundations. At Florence he added many towers to the city walls; constructed 1324 or 1332 the porta a S. Friano, or S. Frediano; built the barbacans before the other gates; and the minor entrances to the city; enlarged the piazza maggiore; with other works; made 1342 a design for a palace for Gualtieri, duke of Athens (expelled from Florence 1343); and also for a fortress on the side of S. Giorgio. 14. 28. 73.

He died in 1345 at Florence, and was buried in the cathedral: the inscription is given in Pen. Cycl. *Supp.* His sons were Tommaso and Nino: G. Balduccio of Pisa, a pupil, worked at Milan. The statue of S. Peter in the east side of the chapel of Sta. Maria della Spina at Pisa, is stated to be a portrait of Andrea; *Handbook*, 1846, p. 459. Bonanni, *Memorie — di F. Traini*,

Pisa, 1846; Albertini, *Memoriale*, 1510; Ciampi, *Cino da Pistoia*, 8vo., Pisa, 1808, p. 153; Gaye, *Carteggio*, 1840, i, 477.

PISANO (Nino), a son of Andrea, was a sculptor.

PISANO (Tommaso), a son of Andrea, was a sculptor; he finished the chapel of the campo santo at Pisa, at which city 1350 or 1356 he added the upper portion of the campanile; and the former altar screen of the duomo, now in the campo santo, is by him. Webb, *Eccles. Sketches*, 8vo., 1848, p. 357. Grassi, *Descr. Storica*, 8vo., Pisa, 1836, ii, 92. Pisa. 3. 73.

PISANO (Nicola), and his son, an able sculptor, living in xv cent., were employed in sculpture at Orvieto. They have been confounded with the more celebrated Nicola Pisano, who died (1278 or) at least 12 years before the first stone of the cathedral was laid, certain sculptures in which have been attributed to him by Vasari; Marchese, *Lives*, 8vo., Dublin, 1852, i. 64.

Another Nicola Pisano, cir., 1512, a painter, is referred to by Rossetti, *Padua*, 12mo., Pad., 1780, p. 32.

PISAURUM; see Pesaro, in central Italy.

PISCIDIA ERYTHRINA; see Dogwood.

PISCINA. The Latin term; Fr. *citerneau*, a deep (filter) well (*citerne* being the tank for immediate use, *citerneau* the little filter supplied from it) for a subterranean receptacle or reservoir for water. At Alexandria, the remains of those constructed by the Ptolemeis; at Baiæ, the *piscina mirabilis*; several at Constantinople (Civil Engineer, etc., *Journal*, 1855, xviii, 163); at Rome, the *sette sale* (Braun, *Rome*, 44); at Volterra, *il castello* (Dennis, *Etruria*, 1848, ii, 163; Gori; Repetti, v, 816; Hoare, *Classical Tour*). Vitruvius; Frontinus.

PISCINA. The Latin term for a stew or stock pond for fish.

Also for a large swimming bath in the open air, either of tepid water warmed by the heat of the sun, or from a naturally warm spring. It differs from the *baptisterium*, not being under cover, and colder. The cold water bath was named indifferently by ancient authors, natatio, natatorium, piscina, baptisterium, and puteus; and the warm water bath, piscina or calida piscina by Pliny, *Ep.*, ii, 17; and Suetonius, *Nero*, 27; calda lavatio by Vitruvius; balineum and labrum by Cicero, *ad Att.*, ii, 3; and *ad Fam.*, xiv, 16; and solium by Cicero, *in Pison*, 27. 78.

PISCINA LIMARIA. A tank constructed at the commencement or termination of an aqueduct, for the purpose of allowing the water to purify itself by depositing its sediment before it was transmitted through the city. Some are on a large scale. A small one, figured in Rich, *Dict.*, 2nd edit., 8vo., London, 1860, formerly existed under the Pincian hill, at Rome, and served to purify the aqua Virgo. It was two vaults high and wide; the water came into the upper one, Fig. 1, A, sank into B, and then passed by an opening into the adjoining lower one C, rose into D, and thence away by a conduit. In the second lower vault was a sluice for the removal of the sediment into the sewers. The above woodcut is explained in *Detached Essays*, Aqueduct, as the *castellum* or supply reservoir. The large *piscinæ* served also as reservoirs for the adjacent country, and were properly *castella* if above ground, *piscinæ* on the level of the soil, and *cisternæ* if sunk in the earth, like the remarkable examples at Constantinople. In all cases they should be understood to be covered with a vaulted roof, sometimes supported by pillars. Fig. 2 is given as the deposit reservoir, *piscina limaria*, or *limosa*. A woodcut of the castellum of the thermæ of Antoninus Caracalla supplied by the aqueduct of Antoninus, is given in *Pompeii* of the Library of Entertaining Knowledge, 1832, i, 195. 25.





PISCINA. A small stone basin, ordained by pope Leo IV (847-54), and in use in Roman Catholic church service to receive the water used in cleansing the chalice subsequent to the celebration of the mass. The drain from it was always carried into the ground in England. It is often formed as a bracket, more or less projecting, but most generally it is placed in a niche, sometimes in the north wall, but more usually in the south wall of the chancel, near the sedilia, with which it is often made to accord in the architectural enrichment; as at Preston church, Sussex, given in Brandon, *Analysis*. In the niche, about halfway up, is sometimes a shelf to hold the sacred vessels. Sometimes two basins are seen; one is then for the rinsings, the other for common water, or in which the priest washed his hands. "We order a font for washing the hands of the officiating priests, which may be either pensile or affixed to the wall"; Du Cange. Bloxam has stated that he found the double piscina first mentioned in the works of Claude de Vert, a French author of the early part of the last century; Associated Societies, *Reports and Papers*, 1865, lxiv. In S. Mary's church, Castle Ashby, Northamptonshire, the piscina has two trefoiled orifices, above them a shelf pierced for a drain with a circular bason, and above this the ordinary shelf (Eccles. *J.*, 1846, vi, 80). Sometimes a recess, running inwards, in one or both sides of the niche, is seen, the use of which is unknown. 1. 17. 19

There is no special illustrated publication on the piscina. *Origin and Use of Piscinæ*, in Builder *Journal*, 1845, iii, 477, 489, 523, gives those at Haddenham church, Bucks., and at Aylesbury church. Clarke, *On Stone Seats, Piscinas, etc.*, in Archæologia, 1808, xi, 347-58. *On the Uses of Piscinas*, in Ecclesiologist *Journal*, 1848, viii, 329-60. One of the finest examples in England is in S. Alban's abbey church. Several single ones are given in Carter, *Ancient Arch.*, fol., London, 1795, pl. 58. Of the rarer *double* piscinas, an example occurs in Salisbury Cathedral; and in Ashwell church, Leicestershire.

A piscina in the south wall *high above* the rood loft occurs at Bury Church; in the south wall *high up* at Wigmore church, both in Herefordshire; in the south wall of clear story (xiv cent.) at Maxey church, Northamptonshire; in east wall south of the chancel, at Deddington church, Oxfordshire; and in south wall of the nave (xiv cent.) at Eastbourne church, Essex; J. Severn Walker, in Associated Societies, *Reports, etc.*, 1874, p. 182. Notes and Queries *Journal*, 1863, 3rd Ser., iv. As at Maxey and in the tower at Froome Selwood; that at Maxey is doubted in Notes and Queries *Journal*, 1863, 3rd Ser., iv, 361-2. Also 1858, v, 311: 1866, ix, 148.

In the *north wall* of the chancel is a trefoiled niche with a piscina, at S. Remigius, Water Newton, Hampshire; Ecclesiologist *Journal*, 1847, vii, 197.

That rare arrangement, a *ground piscina*, if it be one, at S. Botolph, Hevingham, Norfolk; Eccles. *J.*, 1846, v, 73.

In Scotland, double piscinas occur in abbey church at Arbroath, and S. Bridget's, Douglas, Lanarkshire. One instance only of a shelf occurs in the places noticed in Muir, *Churches of Scotland*, 8vo., London, 1848, xxii. A table, tomb, or the aumbrye itself may have served the purpose; some instances of peculiar formation in the niche apparently intended to meet the requirements of the credence, are also noticed.

A domestic piscina is noticed s. v. water drain.

Of *Foreign examples*, ten are noticed in Webb, *Continental Ecclesiology*, 8vo., London, 1848. Daly, *Revue Générale*, 1854, xi, 337, pl. 27, gives one under the north tower of Bayeux cathedral: and xii, 178, pl. 22-6, several by Ruprich Robert; as a double one in a chapel in the church of S. Ouen at Rouen; a double one in a chapel in Dol cathedral, which has also a double draining place under the other ones; another double one in the church of Oistreham (Calvados) united with ambry and sedilia; in Seez cathedral, and in Coutances cathedral; a Norman one in the priory of S. Gabriel (Calvados), where the water would appear to have run down on to the pavement; a fine double one in the salle du trésor, in Bayeux cathedral; and gives p. 183, the chimney of the piscina at Bayeux, serving "à l'écoulement du gaz ou de la fumée des réchants". Didron, *Annales Arch.*, gives a very rich and canopied example, xiii cent., in a chapel of the apse of Notre Dame de Sémur; also engraved in Builder *Journal*, 1847, v, 110. Gailhabaud, *L'Arch. du Vme., etc.*, 4to., Paris, 1854, iv, gives an elaborate one with a shelf, in the sanctuary of the upper chapel Palatine at Paris; one in the abbey

church at S. Gabriel (Calvados); and another, very rich, Renaissance, in the church at La Ferté Bernard. A very curious one, XIII cent., at Redon, is given by NODIER ET TAYLOR, Bretagne, ii; and at Vandesincourt church, Champagne.

PISCINA. The term in early times in the Latin church for the shallow reservoir or tank formed in the *baptisterium*. In the Greek church it was called "choneion". FONT. BINGHAM, *Origines*, 8vo., London, 1840, ii, 466; b. viii, ch. 4.

PISÉ, or PISAY, WORK. A term said to be derived from Fr. *pisoir*, the name of the instrument with which the earth is rammed; BURNS, *Mechanical Arts*, 2nd edit., 8vo., Edinb., 1860, p. 125; who, 124-30, calls it "pisé, or hard-rammed earth". "Pisé, a more scientific and durable walling for cottages than COB WORK, has been some time adopted in England, introduced by the late Mr. Holland, the architect. It is in great repute in Italy and the south of France; at this time it is well known in England. If several cottages are to be built for the labouring class of men, it is on every account worthy to be adopted. On a foundation of stone or brick about 18 ins. above the surface, the pisé formed of loam is thrown in and beaten down in frames about 2 to 3 ft. high at a time; the doors are cut out after the wall is built. The process was published by the BOARD OF AGRICULTURE, *Communications*, 4to., London (1797, i, pt. 2, p. 97; and i, pt. 4, p. 387, etc., by H. Holland: also i, pt. 4, p. 403, JANCOUR, *On the mode of building in France termed Pisé*). A greatly improved operation of the pisé walling has since been separately published"; PAPWORTH, *Rural Residences*, 8vo., London, 1818, p. 15.

COINTEREAUX, *Traité sur la construction des manufactures et des maisons de Campagne*, 12mo., Paris, 1791, states that pisé work had been practised in the province of Lyon for ages: this work was translated by Holland as above noticed, but only earth or the most common materials are used. COINTEREAUX, *Ecole d'Arch. rurale, dans lequel on traite du nouveau Pisé inventé par l'auteur*, 8vo., Paris, 1791. The French mix chopped straw, hair, etc. WOODS, *Letters, etc.*, 4to., London, 1828, i, 36, notices that "South of Lyon are the constructions in pisé, which (1816) I suspect would not suit a climate so wet as ours; the material seems to be *gravel and clay*, formed into blocks in a sort of mould on the work itself, and separated by pretty thick beds of mortar. In some districts these blocks are pretty regular parallelopipeda, about 6 ft. long and 3 ft. thick; in others, they are very irregularly shaped, like Cyclopæan masonry." TAPPEN, *Professional Observations*, 8vo., London, 1806, p. 42, states *clay* is used. BUILDING NEWS *Journal*, 1856, ii, 635; 665; 731. BLONDEL, *Cours d'Arch.*, 8vo., Paris, 1777, v, 424, pl. 84, fig. 10. MORISOT, *La Propriété Journal*, 4to., Paris, 1833, ii, pl. 28, p. 146. CHAMBERS' JOURNAL, July 1857, p. 14. 1. 6. 25. 14.

On the coast of Andalusia are watch-towers constructed of stones, mortar, and rubble (or lime and sand with small stones) rammed down in frames; FORD, *Handbook*, 1847. The Goths continued the practice, calling the method "formatium" (sepmentum formaceum, SMITH, *Dict. Ant.*, p. 47a, 48a) and "horma". Near Aleppo is a village in which each room has a cupola, all of well beaten earth composed of clay and gravel, each layer of which is beaten till it is very hard; they are never out of repair; sometimes the upper part is plastered; ETON, *Survey of Turkish Empire*, 8vo., London, 1798, p. 230. CLAY WALLING. COB WALLING. FORMACEUM or FORMARIUM OPUS. CONCRETE BUILDING. CEMENT BUILDING. EARTH BUILDING. TAPIA.

WILD, *Instructions of the Art of Building Cottages, etc., with earthern walls*, 8vo., 1835. BARBER, *Designs;—with Best mode of building in Pisé*, 4to., Lond. ATKINSON, *Cottage Architecture*, 8vo., London, 1805. *More extensive employment of Concrete—for Building purposes*, CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 156; 369. CRESY, *Cottages of Agricultural Labourers*, 8vo., London, 1845. BUILDER *Journal*, 1847, v, 318, 342, 364, in Suffolk and Essex; and 388 in Norfolk. ECCLESIOLOGIST *Journal*, 1849, ix, 217, 287. ENGEL, *Der kalk-sand, Pisé bau, etc.*, in Thaerbibliothek, vol. 34, 8vo., 1874.

PISIDIA. The northern part of the Syrian and Roman provinces of Pamphylia. The chief towns were Antiocheia, Sagalassus, and Selge. FELLOWS, *Excursions in Asia Minor*, 8vo., London, 1839, p. 165-172. ARUNDELL, *Discoveries in A. M*, 8vo., London, 1834: and *Visit to the Seven Churches*, 8vo., 1828. DAVIS, *Anatolica*, etc., 8vo., London, 1875. 14.

PISINO (Ger. MITTERBURG). A town in Istria, in the Austrian dominions, situated on the river Fluva. A view of the campanile to the cathedral is given in *Illustrations*, 1848-49, i, pt. 3, pl. 25, s. v. campanile. 28.

PISISTRATUS; see PEISISTRATUS.

PISMESH KALESI, near Doganlu, is supposed to identify the ancient town of NACOLEIA or Nicoleia, in Phrygia Epictetus. MIDŒUM.

PISON. He designed the primitive church of Notre Dame du Puy, at the end of X cent., of which some portions remain in the present edifice. BOURASSÉ, *Cathédrales*.

PISSON (JEAN BAPTISTE), born 21 March 1763 at Ghent, was a pupil of J. B. d'Huyvetter. He designed 1792 a house for baron de Neulenaere (pl. 43); the château de Mooreghem near Audenaarde; country houses at Oostacker (pl. 53); 1802 Wondelgem (pl. 65) and upon the Pêcherie at Ghent; in which city he designed many houses (pl. 99), bridges, quays, gates, *pompes*, the botanic garden, the colonne départementale, the new staircase and interior embellishments of the town hall; with the triumphal arches, decorations and fêtes given to Napoleon in 1801. He died 15th December 1818. GOETGHEBUER, *Choix des Monumens*, fol., Ghent, 1827, to which work the above plates have reference.

PISTOIA (ancient Pistoria). A town of Tuscany, in Northern Italy. On the well-preserved ramparts are the Medici arms, placed after the capture of the town by the Florentines, 10 April, 1306: some of the bastions are by Buontalenti. The streets generally retain their primitive aspect. The *duomo*, dedicated to S. Jacopo, Zenone and others, was commenced 1063 by Busketus (as s. v.); (late Pisan Romanesque); and considered by WEBB, p. 388, to be anterior to the Pointed style of Nicola; it has a crypt. In 1240 enlarged and decorated by Nicola Pisano, who (or Giov. Pisano 1298) renewed the vaulting and rebuilt the tribune, itself taken down 1299 for the choir by Giov. Pisano. The chapel of S. Jacopo 1260-70 by Buono; the tribune 1599; the roof 1657; the interior was much modernised 1838-39. The portico, incrusted with black and white marble in 1311 or 1360; its bas-reliefs 1505 by A. della Robbia. The large and sumptuous altar (now in a chapel), an enamelled shrine or *paliotto* to S. Jacopo, begun 1316 by Andrea di Puccio (Jacopo) di Ognabene, and continued by others to 1466; WARING, *Arts connected with Arch.*, fol., London, 1858, pl. 36, coloured. The font, its architecture and sculpture of the finest cinquecento work, is by Andrea Ferrucci. A tomb to Cino di Pistoia, died 1336, by And. Pisano or Cellino di Nese, from designs by Gemo da Siena. The campanile, a dungeon tower (TOLOMEI, *Guida*, read 1200 on it), is said to have been begun 1240 by Nic. Pisano; about 1301 Giov. Pisano (or Ciro) adapted it, and added the three tiers of arches and lofty spire, GAILHABAUD, *L'Arch. du Vme*, 4to., Paris, 1858, i, pl. 56, coloured; WARING AND MACQUOID, *Arch. Art*, fol., London, 1850, pl. 9; BUILDING NEWS *Journal*, 1873, xxv, 424, with a double plate. The *baptistery* or S. Giovanni rotondo (Italian pointed), an octagon with a square ended chancel and vaulted, is said to be 1330-37 by And. Pisano, completed some years after 1337 by Cellino da Nese, but the body of the beato Atri was found 25 January 1337 while digging the foundations (VASARI); the square font is of much earlier date (*cir* 1256). A doorway with pulpit at its side is given in SHAW, *Arch. Sketches*, fol., London, 1858, pl. 62.

S. Andrea, considered to have been the first cathedral, and by Buono, the designer of the campanile of S. Marco at Venice. The portal if not the church, 1166 by Gruamons and Adeodatus according to the inscription given s. v. (WARING, etc., pl. 8). The fine pulpit 1298-1301 by Giov. Pisano (inscription in WEBB) is similar to that by his father Nicola at Pisa, and considered by

CICOGNARA, *Scultura*, of greater merit. S. Bartolomeo in Pantano (early Tuscan Romanesque) 1167 has Rodolphinus inscribed on the façade. The pulpit or reading desk 1250 is by Guido da Como. S. Domenico (brick Pointed), about 1280 by Giov. Pisano, continued after 1284 by fra P. dell' Ancisa, and completed 1380 (after 1300 VASARI). The chapel or altar Rospigliosi, cir. 1655, is by G. L. Bernini. S. Francesco (Italian Gothic, round arches), 1292 as inscription in the choir, and attributed to fra Elia Coppi 1265-94; a wide nave without aisles or chapels. S. Giovanni Evangelista or Fuor Civitas (Romanesque with pointed arches at the altar end) 1150 attributed to And. Pisano; or 1166 by Gruamons (as s. v.), inscribed on the north door, or was only the sculptor. A large and oblong apartment with low open timbered roof; externally of black and white marble; view in WARING, etc., pl. 8. The rich pulpit is attributed 1286 to Giov. Pisano by MORRONA; or 1270 by a certain Guillaume, (by TIGRI); and to a nameless German, by VASARI, (GAILHABAUD, *L'Arch. du Vme*, 4to. Paris, 1848, iv, pl. 53). The fine holy water basin by Giov. Pisano. Sta. Maria delle Grazie (Renaissance) completed 1535 from the designs of V. Vitoni. Sta. Maria dell' Umiltà (Renaissance), begun 1494 or 1509 by V. Vitoni, is octagon; the fine cupola, after that to the sacristy of Sta. Spirito at Florence by S. Pollajuolo, was carried out 1561 from Vitoni's designs by G. Vasari, but it had to be bound with iron; the rectangular vestibule is also vaulted and domed; GRANDJEAN ET FAMIN, *Arch. Toscane*, fol., Paris, 1846, pl. 105, plan and section. S. Paolo, founded 748; front (Pisan Romanesque) about 1136; built 1302 by Busketus (WEBB), of verde di Prato and a grey limestone; great portal attributed 1323 to Giov. Pisano, but he died 1320, perhaps therefore by Giov. da Pistoia who 1302 did the statues. S. Pietro maggiore, founded 748; lower part of façade and side walls 1263 by Buono; remainder much altered; interior modernised; grated galleries above the nave arches for nuns. S. Salvatore, rebuilt 1270 by Buono of Florence, and J. Squarcione, of which date is the façade (Pointed Pisan Romanesque); inscription given in WEBB, p. 388; church partly altered.

Other erections are S. Desiderio; l'Annunziata of the Servites, much modernised; Sta. Maria degli Angeli; S. Felipo Neri; Sta. Maria nuova, attributed 1266 to Buono, has a nave and rounded apse; an inscription given in WEBB: Sta. Maria della Neve 1608-16 by D. Frosini; and S. Giuseppe, a nave and rounded apse and a fair west door.

Palazzo della communità or degli Anziani (Italian Pointed), 1294-1385; the noble cortile has two stories of Pointed arcades. Pal. pretorio, 1368-77 (same style), frescoes in the court restored 1844. The former bishop's palace (early plain Pointed) has the outside nearly unaltered. Pal. vescovile (Italian) 1787 for bishop Ricci, by Ciardi of Pistoia. Pal. Panciatichi, now del Bali Cellesi, XV cent., a vast mass, as is the Pal. Cancellieri. Pal. Bracciolini, Tolomei, and Forteguerri. Villa Rospigliosi cir. 1655 by G. L. Bernini. Casa Piccini. The Sapienza or college, *cir.* 1670 by G. Silvani; the biblioteca Fortiguerra in a large room therein, and the bib. Fabbroniana. The ospedale del Ceppo founded 1218, dates 1277, and modernised; its chapel now used as a ward; the frieze of coloured porcelain *cir.* 1528 or 1538 by the della Robbia; elevation in LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 97. The theatre was by A. Galli Bibiena.

Near the city are the baths of Monte Catino, renowned in the Middle Ages; rebuilt for Leopold I, by N. G. PAOLETTI, and published in *Raccolta de' disegni*, etc., fol., Fir., 1787, 14 pl. The plan is given in LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 35.

Illustrations, s. v. Corbel, i, pt. i, pl. 5. WEBB, *Continental Ecclesiology*, 8vo., London, 1848. TOLOMEI, *Monumenti Pistoiesi*, and *Guida di P.*, 8vo., 1821. CIAMPI, *Sagrestia Pistoiesi*, etc., 1812. TIGRI, *Nouveau Guide de la Ville de P.* ZACCARIA, *Bibliotheca Pistoriensis descripta*, Turin, 1754. FIORAVANTI, *Memorie Storiche*, Lucca, 1758. ANON., *Istorie Pistolesi*, Flor., 1578. FREEMAN, *Historical Sketches*, 8vo., London, 1876, p. 248. VIANI, *Della Zecca*, etc., Pisa, 1813. ECCLESIOLOGIST *Journal*, 1868, xxvi, 326-7; and BUILDING NEWS *Journal*, xvi, 65. ROHAULT DE FLEURY, *La Toscane au Moyen Age*, fol., Paris, 1870-3, and *Lettres sur la Toscane en* 1400, 8vo., 1874. 14. 50. 28. 96.

PISTORI (GABRIELE), with M. Bontempi, 1256, designed the palazzo, later the archivio notarile, in the piazza Sta. Agata, at Cremona. 57.

PISTRINUM. The Latin for a mill, which with a bakehouse (*furnum*), was attached to every Roman establishment. 78.

PIT. A frame sunk in the ground and having walls; it is used for forcing fruit trees in pots, or for strawberries, melons, etc. Fire heat or a bottom heat is used. PINERY.

PIT OF A THEATRE. (It. *platea*; Sp. *platea*; Fr. *parterre*; Ger. *parterre*. The lowest part of the auditory, and sometimes passing under the boxes or dress circle.

PITCH. When TAR, or the juice of the tree, is subjected to heat, in various ways according to the nature of the pine or fir whence it is procured, a volatile spirit is distilled from it, leaving a black mass which is termed pitch. This is melted by heat, and used in the country for painting outside woodwork where appearance is no object, as it renders such work watertight. Felt and similar roofs are so covered. TAR PAVING. Burgundy pitch is the sap of the spruce fir. PENNY MAGAZINE, 1843, xii, 43.

PITCH OF AN ARCH. The same as the versed sine, or height from the chord line of the springing to the underside of the arch.

PITCH OF A ROOF. The proportion between the height and the span of a roof. When the length of the rafters is equal to the width of the building, the roof has been called "Gothic pitch"; when equal to three quarters of the breadth, "True pitch"; and when two-ninths of the breadth, "Pediment pitch". PRICE; LANGLEY; and other authors on building, of the early part of XVIII cent. In this country the pitch necessary for throwing off the water depends upon the covering used.

PRICE)	Large slates	22·0	½	height in parts of span
	Common slates	26·33	⅓	,, ,, ,,
	Stone slates	29·41	⅜	,, ,, ,,
⅜ or ⅔	Plain tiles	29·41	⅜	,, ,, ,,
⅓	Pan tiles	24	⅓	,, ,, ,,
	Thatch	45·0	½	,, ,, ,,

GWILT, *Ency.* Glossary, 1876. Metal flat; see Flat. 1. 19.

DENISON, *Lectures*, 2nd edit., 8vo., London, 1856, considers that for parish churches the angle formed of the radii of a pentagon was used; while for higher buildings that of a hexagon served. SCOTT has observed that the proportion of 7 for the span to 6 for the rafters gives nearly the first-mentioned angle, which may thus be considered a good one. Aile roofs, when of a lean-to form, were of rather a flatter pitch than that of the nave (BRANDON, *Open Timber Roofs*, 4to., London, 1849), so as to have no more walling over the arches than possible. FERREY, in CHURCH BUILDER *Journal*, 8vo., London, 1863, ii, 176-80. STREET, *Woodwork*, Royal Inst. of Brit. Architects, *Sessional Papers*, 1865-6, p. 90, 94.

PITCHER. A squared stone used in footways, brought from the island of Purbeck, near Portland island. It is used in courtyards, each being from 6 to 10 ins. square, and 5 ins. thick.

PITCHING. The term in masonry for knocking off gallets. Also the same as paving and applied to granite blocks prepared for a road. The cubes, 9 in. deep, are called 'sovereigns'; stones less than 9 in. are 'half sovereigns': thus a stone 7 ins. deep and 4 ins wide would be 'a 4 in. half sovereign'.

PITCHING PIECE of stairs; see APRON PIECE.

PITCH PINE. The Pinus rigida. It is found spread over the wide tract of country lying between the rivers Penobscot and Mississippi in North America. It is of almost perfectly straight growth. The Southern States produce the best spars for masts, square timber and plank. The timber is usually imported in well hewn logs of 11 to 18 ins. square by from 20 to 45 ft. in length; the planks varying in thickness from 3 to

5 ins. by 10 to 15 ins. in width, and from 20 to 45 ft. in length. It is used in shipbuilding for beams, shelf and bottom planking, etc., and in building wherever long straight and large scantlings are needed; it will not, however, make good board for joiners' general purposes, although used to some extent for cabinet work. The wood is of a reddish-white colour, clean, hard, rigid, highly resinous, regular and straight in the grain, and somewhat difficult to work; it is good in quality, and considered to be durable; the principal defects being the heart and cup shake, the latter often extending a long way up the tree, so that the timber should be used in large scantlings to guard against a waste of wood near the centre. A number of experiments are given in Laslett, *Timber and Timber Trees*, 8vo., London, 1875, pp. 286-91, showing that nearly all the specimens broke with a short fracture. Pinus.

Pitch pine is also imported to England from Charleston, New Hampshire. It is much used in the West Indies, etc., for flooring, as it is free from the attacks of the white ant. In England it is preferred for floors often washed, and invaluable for treads of stairs; but below red and yellow pine in rank. It is much redder than Scotch fir; and brittle when dry. Warburton, etc., *History*, etc., 4to., Dublin, 1818, ii, 1152, states that pitch pine is preferred to oak for durability. In 1835 it was almost unknown in the London market. *Price of pitch pine*, Building News *Journal*, 1872, xxii, 34. *Good for out-door work*, xxviii, 251, etc., and xxix, 407; 1876, xxxi, 413. Posts of pitch pine were subjected by Capt. Shaw to a petroleum fire for seven hours, with a satisfactory result; Building News *Journal*, 1874, xxvi, 227.

PITCH-STONE. The pitch-stone dykes and veins in Arran are of great interest, the mineral being comparatively rare in Britain. It appears of a dark-blackish green colour, almost like a piece of bottle glass, sometimes with small specks, and occasionally large crystals of felspar disseminated in the base, giving it a more or less porphyritic texture: analyses of four different specimens are given in Building News *Journal*, 1869, xvi, 384.

PITENTINUS (Albertus), designed 1188 the ponte Mulina or dam, with its twelve mills, at Mantua. Coddè, *Memorie Biographiche*, 8vo., Mant., 1837, p. 129-31.

PITHEUS, PITI or PITIUS; see Pytheus: and Pythius.

PITHOS. A very large jar used by the ancients to keep a stock of wine or oil in: and still in use in the south of Europe. Winckelmann gives a bas-relief representing Diogenes in a broken pithos of large size; in Rich, *Illust. Comp.*, 1849. Fairholt, *Dict. of Terms*, 8vo., London, 1870.

PITOT (Henri), constructed 1742-52 the aqueduct of 70 arches at Montpellier: *Detached Essays*, Aqueduct, pl. 3, and fig. 14. Frossard, *Nismes*, etc., 8vo., Nismes, 1834-5, ii, 53; and 8vo., Paris, 1846, p. 275.

PITT (John), commissioner of trade and plantations, and surveyor-general of H. M. woods and forests, built the house (Italian) at Encombe, Dorsetshire, after 1734: it was possessed 1824 by lord Eldon. Storer, *Portfolio*, iv.

PITT (Thomas), first baron Camelford (1784-93), is considered to have designed about 1775-90 the south front 916 ft. in length, and other additions, to the mansion of Stowe, originally designed by Richard Temple, first viscount Cobham. *Stowe: Descr. of the House and Gardens*, 8vo., Buck., 1817, which gives the only known representation of it. The temple to Concord and Victory, and the smaller one to princess Amelie, are also attributed to him by Dallaway, in Walpole, *Anecdotes*, edit. 1862, p. 694. Lipscomb, *Bucks*, fol., London, 1847, iii, 84-108, describes the place and gives the north façade. Borra. Valdré.

PITTSBURGH. The second city in Pennsylvania, in the United States, situated in the angle between the rivers Monongahela, over which are five bridges, one being 1500 ft. long, and the Alleghany, having seven bridges, three of which are covered, and one with a footway over its top. These rivers unite to form the Ohio. On the opposite banks are large suburbs. A fire 1½ miles long, on 11 April 1845, destroyed the entire business quarter (Illustrated London News, vi, 314), including the western university of Pennsylvania. Of the thirty-five churches, only the Roman Catholic Cathedral dedicated to S. Paul, having two spires and a dome; the first and third Presbyterian churches; S. Peter's and Trinity (Episcopal); and the first Baptist church, are considered of note. The town also possesses a custom house, containing post office and courts; the new court house with a dome; municipal hall with a large central tower; the United States arsenal; numerous large factories arising from the rich fields of coal and iron; a noted penitentiary, by J. Haviland; and large public school buildings. Ripley and Dana, *American Cyclopædia*, 8vo., New York, 1875. A notice of S. Peter's chapel occurs in Ecclesiologist *Journal*, ix, 432. 50.

PITUENZA (Florino de), with Cassandro Romano, *maestros de jometria*, directed the rebuilding of the walls 1090-98 of the city of Avila del Rey in Spain. Sommerard, *Les Arts, etc.*, 8vo., Paris, 1838, iii, 363, calls the former 'Kiluenza, maître François', and the latter, 'maître romain en géometrie'. The cathedral was being erected 1091-1107. Dussieux, *Artistes Français*, 8vo., Paris, 1856, p. 214, calls him a Burgundian. Cassandro. 66.

PIVOT (Gr. στρόφιγξ, pivot; στροφέυς, socket). The projection, pin, or gudgeon, shaped like a top, set into the top and bottom of the hinge-style of a door or gate, so as to sustain it and give it motion. Cardo, whence *cardinalis scapus*, a hinge style. The term Crapaudine door was formerly given in England to such an one, from the French term for the plate at the bottom; the Fr. *bourdonnière* being the top centre pivot. Carchesium. The usual modern 'spring hinge' works in a similar manner. Buchanan, *Millwork*, 8vo., Lond., 1841-42, p. 346-7. Door; Stone. An Egyptian stone pivot in the British Museum; and another of bronze from Pompeii, are figured in Rich, *Illust. Comp.*, 1849. Those to the doors of the hall of the Abencerrages at the Alhambra, are given in Daly, *Revue Générale*, vi, 11. In the British Museum is a stone door having a pivot brought from the Hauran: and also the bronze pivot, shaped like the shoe to a pile, found 1877 with the gates at Balawat. 4. 25. 79.

PIVOT LIGHT. A small window of one light only, hung on side pivots and centres so that the lower part swings outwards.

PIX and PYX. The small casket used to contain the consecrated wafer or host, in the Roman Catholic church; also the unconsecrated bread. Ciborium. Lee, *Glossary of Liturgical, etc., Terms*, 8vo., London, 1877. Pugin, *Glossary*, 4to., London, 1846, 2nd edit.

PIZANI (.....); see Pizzoni (.....).

PIZANO (Luis) with Micer Baltasar, engineers of Padua, in 1535 reported upon the fortifications at Perpignan. The former had superintended these works, constructed by Henrique Gilabert; and appointed 1539 engineer-in-chief, he directed 1543 those at Barcelona and at Rosas; Gilabert also constructed the works at Elna and other Spanish stations in the Mediterranean. Quilliet, *Les Arts Italiennes*, fol., Rome, 1825, p. 20, states that Micer was a son of Antonio Micer of Florence; they both went to Seville, where he is supposed to have died soon after 1554. 66.

PIZZAFUOGO; see Dattaro (F.) of Cremona.

PIZZAGALLI (Felix), restored 1835-39, the church of Sta. Maria in monte Carmel, at Milan; Webb, *Cont. Eccles.*, 8vo., London, 1848, p. 217, gives the inscription. Milan.

PIZZALA (.....), designed the covered galleria de Cristoforis or arcade, in Milan.

PIZZONI, also called PIZANI (.....) of Milan, designed 1750-72 (Roman Corinthian) the cathedral church of S. Aubin at Naemen or Namur; it is also ascribed to Charlmagne of Dinant, and is dated 1750-67 in Goetghebuer, *Choix*, etc., fol., Ghent, 1827, p. 65. Commission de Bruxelles, *Bulletins*, xiv, 531. Weale, *Handbook to Belgium*, 8vo., London, 1859, p. 351.

PLACARD. A French term used *cir.* 1700 in England, for "the decoration of the door of an apartment, consisting of a

chambranle crowned with its frieze or gorge, and which sometimes has its cornice supported with consoles. 2. 4. 25.

PLACE (It. *piazza*). The French term for an open space or square, in a city. The subject, architecturally, is discussed in DALY, *Revue Générale*, i, 748; vii, 302; viii, 448; xvi, 252; those at Paris are cited in the Index. 6. 25.

PLACE (GEORGE GORDON), of Newark and Nottingham. The following buildings are referred to in the ECCLESIOLOGIST *Journal*:—S. James, Woolsthorpe, Lincolnshire (1846, iv, 152); S. Giles, Costock, Notts, v, 396); S. John Evangelist, Manthorpe (vi, 139); S. Matthew, Morley, Derbyshire (viii, 68); 1851-53, S. Botolph, Boston, Lincolnshire (ix, 236; BUILDER *Journal*, ix, 301; x, 86; xi, 328); S. ....., New Basford, Notts (xiv, 309); Chapel School, Chilwell, Notts, (311); S. Peter's Rectory, Derby (312); S. Giles, Balderton, Notts. (316); and S. Stephen, Snenton, Notts (1862, xv, 64). He measured and drew *Plans, etc., of the Chancel of All Saints' Church, Hawton, Notts*, for the Cambridge Camden Society, fol., 1845. He resided abroad for some years and there died.

PLACE BRICK. The act 1725-6, 12 George I, c. 35, referring to that of 10 Eliz., 1567-8, describes the manufacture of bricks; that grey stock bricks be burnt in clamps, and the bricks commonly called place bricks in the same clamps, on the outside of the said grey stock bricks, by means whereof great part of the bricks now usually made are so hollow and unsound that they will scarce bear their own weight (which might perhaps be somewhat due to faulty manufacture); then decides that they are "to be burnt by themselves in clamps"; while 1729-30 3 George II, c. 22, which refers to an amendment of the previous year, states that the "stock and place brick may be burnt in one and the same clamp but apart", not intermixed—and declares the size when burnt to be not less than $8\frac{3}{4}$ ins. by $4\frac{1}{8}$, and $2\frac{1}{4}$ thick.

Place bricks were described 1786, "such as are made in a place prepared on purpose for them near the building in which they are to be used"; probably derived from NEVE, *Builder's Dict.*, 8vo., London, 1736, who, s. v. Brick, states that "place bricks are generally made in the eastern part of Sussex, so called because there is a level, smooth place just by, where they strike or mould their bricks, etc. 4. 13.

The red brick largely used in former days was called a "place brick", and was of good quality; but the common modern mottled red brick, also called "place brick", is caused by a deficiency of firing in the clamp, and is therefore soft and rotten, imbibing much water, as further explained s. v. Brick, p. 138; 139-40. A place brick 1747, was said to be the most ordinary sort that was made, and therefore used in foundations, party walls, insides of fronts, etc.: there were two sorts; one, the common; the other, made neater, and called place brick made grey stock fashion; the samel was an inferior, while grey stock and red stock were superior, bricks. LANGLEY, *London Prices*, 8vo., London, 1747, p. 1-2.

In Dublin the "place brick" as there burnt, is the usual building material, while "fire brick" is the superior quality.

PLACENCIA, in Guipuzcoa, in Spain; see ITURRIZZA (P.). 66.

PLACENSIA, in Estremadura, in Spain; see PLASENCIA.

PLACENTIA. The ancient name of PIACENZA, in Italy.

PLACHEE, from Dutch *pleatsje*. A rectangular piece of ground containing buildings and yards enclosed by a stone wall; BOYS, *Sandwich*, 4to., Cant., 1792, p. 316. Perhaps from the low Lat. *placia*, *placiam*, a plot of ground. 19.

PLAFOND. The Fr. term for a ceiling; and so used by many English writers on architecture; and commonly written "platfond". It is also applied to a soffite; as the underside of the corona of a cornice. 25.

PLAIN (.....); see FOURNIER (LOUIS or ISAÏE), 1589-1610 at the Louvre at Paris. LANCE, *Dict.*, states the name is an error for Jean Coin or Coing.

PLAIN FACE; see FACE WORK.

PLAIN or PLANE ASHLAR. Stone after all the marks of the previous dressing have been rubbed away with another stone; see ASHLAR.

PLAIN TABLE; see PLANE TABLE.

PLAIN, CROWN, THACK, or ROOF, TILE. A flat cake of clay burnt in a kiln, used for covering roof timbers, and in forming flat or arched surfaces. By the statute of 1477-8, 17 Edward IV, c. 3, 4, each should be $10\frac{1}{2}$ ins. by $6\frac{1}{4}$ ins. by $\frac{5}{8}$ ins. at least; it also refers to crest, corner, and gutter tiles. Plain tiles now vary in size from $9\frac{1}{2}$ ins. by $5\frac{3}{4}$ ins., to 11 ins. by $6\frac{1}{2}$ ins., $\frac{3}{8}$ in. thick; and the weight of each varies according to make and size from $2\frac{1}{2}$ lbs., 2 lbs. 3 ozs., and 2 lbs. to 5 lbs. 4 ozs. They should have two pin holes near the top for securing them to the laths. In the statutes 12 George II and — George III the size stated is $10\frac{1}{2}$ ins. by $6\frac{1}{4}$ ins. by $\frac{3}{8}$ in. thick. According to this gauge 800 tiles are required for a square of tiling laid with a 3 ins. gauge (being 8 laths in 2 ft.); 700 at $3\frac{1}{2}$ ins. (7 laths in 2 ft.); and 600 at 4 ins. (6 laths in 2 ft.); these give a 4 in., 3 in., and 2 in. lap. Tiles are laid on laths, 1 in. by $\frac{1}{4}$ in. thick, of which a 12 ft. bundle or 500 laths, with a peck of oak pins (fir and zinc pins are also used) are required to each square; these pass over the lath. Tiles are laid free. If they are laid in mortar, 3 hods will be required, being laid 2 ins. wide at the bottom and under each cross joint, the tiles being rubbed together. They are also laid in hay or moss spread evenly on them so as to keep out drifting snow. Heart of oak laths fixed on the rafters with tenter hooks (boiled in linseed oil), at the under edge of the lath has been recommended. Two bricklayers and three labourers should lath and lay four squares per day. Ten ridge tiles are stated to go to each 1000 plain tiles, but this must vary according to the extent of the work. 1. 4.

PLAIN TILE CREASING (or cresting). A row of plain tiles laid flatways on the top of a wall, and projecting over each face, having above it a row of bricks laid "flat", or "on edge", across to steady the tiles, and called a cope or coping. The whole is usually set in cement, and is called "single plain tile creasing"; when two rows of tiles are laid breaking joint with each other it is called "double tile creasing". The object of this arrangement is to throw off the water and prevent its soaking down into the substance of the wall. COPING; woodcut.

PLAIN TILE FLAT. About 210 tiles in each course are considered requisite to a square. A covering of 35 ft. by 12 ft. wide in the clear, formed of three courses of plain tile in Portland cement laid herringbone and interspersed with hoop iron, is described as successful, in BUILDER *Journal*, 1854, xii, 190, and would appear to be one of the earliest so formed. To ensure a good result, the tiles should be well soaked. Plain tile flat roofs on iron rafters, covered with asphalte, were used at the City prison, Camden Road.

PLAISTER. The old way of spelling PLASTER.

PLAN. The horizontal section of a building or part of a building. Plat, plot, and platform were terms formerly used. ICHNOGRAPHY. DISPOSITION. DISTRIBUTION. *Illustrations*, Church plan. During the mediæval period, a plan, and often a MODEL, is to be seen in the hands of an effigy, hence it has been inferred that he was the founder, or the designer, of the edifice. Thus when the body of Osric, king of Northumberland, founder 681 of Glastonbury abbey, died 729, was exhumed, a plan of a church was in his hand; and in Worcester cathedral is a bas-relief of a person presenting a plan marked on a tablet to a superior; CARTER, *Ancient Architecture*, etc., fol., 1795, pl. 54. In the Lady chapel at Caudebec is an effigy with a plan on a tablet; BUILDER *Journal*, 1870, xxviii, 943.

BORDE, *A dyetorie of Health*, 8vo., London, 1547; and BACON, *Essay on Building*, 1598, give rules for planning noblemen's houses. LE MUET, *Manière de bien bastir*, etc., fol., Paris, 1623; transl. by PRICKE, fol., London, 1670; 1675. LOUDON, *Arch. Magazine*, 8vo., 1834-38, passim. HUNT, *Tudor Arch.*, 4to., 1836. *Episodes of Plan*, in CIVIL ENGINEER, ETC., *Journal*, 1841, iv, passim; vi, 19; continued under *Studies of Plan*, 1845, viii, 269, etc.; ix, 269. BUILDING NEWS *Journal*, iii, 1021; vi, 779.

KERR, *The Gentleman's House*, 8vo., 1865, 2nd edit. *The Grammar of House Planning, Cottages, Farms*, etc., 12mo., London, 1864. RICHARDSON, *Englishman's House*, etc., 8vo., 1870. STATHAM, *Notes on Plan as the basis of Design*, BUILDER *Journal*, 1876, xxxi, 141. 1. 5. 14. 25.

Comparative plans of English *monasteries* are described by WALCOTT, in BUILDING NEWS *Journal*, 1870, xix, passim, and *Characteristics of Ground Plans adopted by the greater Conventual orders of England; idem*, 1876, xxxiv, 185.

Excellent examples are shown of the planning by French and Italian modern architects in their publications, such as LETAROUILLY, *Rome Moderne*, fol. and 4to., Paris, 1840, p. 393, pl. 183, s. v. Barberini palace. DALY, *Revue Générale*, in Index, s. v. BLONDEL, *Cours*, 8vo., Paris, 1771, iv, 107.

Ownership of plans, etc.; see DRAWING.

PLANCEER, PLANCHEER, or PLANCERE. The soffit or undersurface of the corona of a cornice of the Italian orders; and it generally means any soffit. MOXON, *Mech. Exercises*, 4to., London, 1700, *Bricklayer's work*, p. 29, applies "plancheer" to the corona itself; and in *House Carpentry*, p. 166, describes "Planchier, an ornament to which the cornice is fastened:" "Plancher or seeling" of a room, occurs in PHICKE, *Art of Fair Building*, fol., London, 1670, p. 2. 1. 2. 4.

The plain or molded edge to the top of the string board of close stairs.

PLANCHED. Floored or boarded, from the Fr. *plancher;* "Plancher" (floor) and "planchering" (flooring) are terms used cir. 1600, in reference to Randworth church, Norfolk, in Norfolk and Norwich Architectural Society, *Papers*, etc. 4.

PLANE. Tools now used by carpenters and joiners in smoothing wood: with others so shaped as to make grooves, rebates, and mouldings. A Roman implement is shown in MONTFAUCON, *Antiq.*, fol., 1722, iij, 216, and called therein (Fr.) *guillaume*. VIRLOYS, *Dict.*, 4to., 1770, shows a *rabot* and *varlope* in pl. 57, fig. 20 and 21, the short and long planes; and fig. 30, *varlope à onglet*. They are not shown in KRAFFT, *Charpente*, fol., Paris, 1805. They took the place of the mediæval adze and axe; and up to the early part of the nineteenth century were little known on the Continent. Each plane comprises the tote, mouth, wedge, iron, sole, fore end, britch, and stock. 1. The *jack plane* of the carpenter, and *fore plane* of the joiner, is used to take off the roughness left by the saw. 2. *Trying plane* for next use. 3. *Long plane* or *jointer* to shoot a board or an edge straight; and 4. *smoothing plane* to clear away irregularities left. A *rebate or rabbet plane* (Fr. *bouvet*) forms a rebate in a board. A *plow* or *plough* is a narrow rebate plane for forming a groove. *Compass* and *forkstaff* planes are for forming curved surfaces. *Moulding planes* are of various forms and sizes; the *filistor* or *philister;* Fr. *bouvement*, for one striking a *doucine* or *cymaise*. *Sash planes*. Each description is noticed herein. MOXON, *Mechanick Exercises*, 4to., London, 1701, p. 61-70, describes them, and the mode of sharpening the irons, etc. GWILT, *Encyc.*, edit. 1867, p. 630-1. Various improvements have been made in planes, as described in PENNY CYCL. *Supp.*, 1846. 4.

PLANE of a column; see STRIA.

PLANE OF THE PICTURE: in perspective; also called the plane of delineation; and PLANE; PERSPECTIVE. 1. 4. 6.

PLANE; INCLINED, or way; or winding way; see STAIRCASE. CORDONATA.

PLANE TABLE. An instrument formerly much used in surveying land, for taking angles and laying down the work upon the spot as it was measured. It consists of a board which receives the paper; it is enclosed in a frame graduated into degrees from the centre, by which the several lines are planed. A compass is also connected with it. BEES, *Glossary*. 4.

PLANE TREE; see PLATANUS: and ACER.

PLANING OF WOOD. Work done by the carpenter and joiner with the tool called a PLANE, to produce a flat level surface. A large proportion of such work has been done for many years by machinery. NICHOLSON, *Dict.*, describes Bramah's and Bentham's machines; also BARLOW, *Treatise on Machinery*, in ENCYC. METROPOLITANA. BUCHANAN, *Millwork*, and Supp., 8vo., London, 1841-2. MOLESWORTH, *On the conversion of wood by machinery*, at INST. OF CIVIL ENGINEERS, *Proceedings*, 1858, xvii, 17, 26. CIVIL ENGINEER, ETC., *Journal*, 1850, xiii, 169. BUILDER *Journal*, 1852, x, 141; xi, 32; xvii, 18. BUILDING NEWS *Journal*, 1871 (More), xx, 222; and 1874 (Furness), xxvii, 249. Supp. 14.

Hunter's *stone planing* machinery; INST. OF CIVIL ENGINEERS, *Proceedings*, 1837, i, 38. The cutter last invented was found afterwards to be similar to a tool used from time immemorial at Dresden. CARVING (wood).

PLANISH, To. In carpentry, to smoothe or plane up.

PLANISHED TIN; see TIN.

PLANISHER. A thin flat-ended tool used by turners to smoothen brass work.

PLANK. (Late Lat., *plancha; plaunchor, plangcher;* Fr. *dosse*). A piece of sawed timber for the use of carpenters. When of fir, it is now cut 10 ins., but usually not less than 11 ins. wide, and 3 ins. thick; Dantzic deck plank is frequently over 12 ins. wide. The term is apparently derived from the Fr. *planche*, as the term "deal" (9 ins. wide), is from the German or Dutch; while the "batten" (5 or 7 ins. wide) has puzzled all etymologists. HUNDRED. A gum wood tree or African oak plank from Van Diemen's Land, harder than teak, 140 or 144 ft. 6 ins. long, 20 ins. wide, and 6 ins. thick, without a knot, is mentioned in BUILDER *Journal*, 1852, x, 141; 237; 412; EUCALYPTUS. *Age of Trees*, in PENNY CYCLOPEDIA, 1833. 1. 4. 25.

Planks turn with their sides upwards; that is, the edges rise from the level of the centre line. This explains why the inside of a plank is turned to the joists while laying a floor, which prevents the twisting.

PLANK BRIDGE. A bridge of timber having the *arcs* formed of layers of planks bent over one another and bolted together. Examples are named s. v. Bent timber; and *Illustrations*, s. v. Girder bridge. KRAFFT, *Charpente*, fol., Paris, 1805, pl. 21, at Joly, over the Seine, 54 ft. span, by C. Berthand; also pl. 19, etc. At Saxby over the Humber, in CIVIL ENGINEER, ETC., *Journal*, 1845, iii, 358. Ouse Burn viaduct and Willington Dean, 1837, by J. Green, in HOSKING and HAHN, *Bridges*, etc.; and in C. E., etc., *J.*, iv, 284; and xi, 33. BARLOW'S TREDGOLD, *Carpentry*, 4to., London, 1853, p. 142, pl. 17, two arches of 153 ft. span at Freisingen in Upper Bavaria. Lynn and Ely Railway over the Ouse, in Inst. of Civil Engineers, 15 Jan. 1850; ARCHITECT *Journal*, 1850, ii, 36; and HASKOLL, *Assist. Engineer's Railway Guide*, 1848, pt. 2: another pt. 2, pl. 168. At Trenton over the Delaware, in STEVENSON, *Civil Eng.*, fol., London, 1834, p. 226. ALLGEMEINE BAUZEITUNG, Ser. 1, pl. 291, over the Schuylkill: Ser. ii, pl. 267, S. Germain railway; and pl. 391-5, several examples in North America. At Eauplet over the Seine, in HOSKING, etc., *Supp.*, p. 114: DUGGAN, *Bridges of United States*, fol., New York, 1850. NOUVELLES ANNALES DE LA CONSTRUCTION, fol., 1856, pl. 13.

PLANK FLOOR or Dutch floor. One formed of thicknesses of planks. KRAFFT, *Charpente*, fol., Paris, 1805, pt. 2, pl. 20, etc. RONDELET, *L'Art de Bâtir*, fol., Paris, 1812, iv, describes a floor executed at Amsterdam for a room 60 ft. square, consisting of three thicknesses of 1½ in. planks, making a solid floor of 4½ ins. without joists. The construction is given in GWILT, *Encyc.*, edit. 1867, p. 600.

PLANKING. The Romans, as well as later constructors, used planks (Fr. *madrier*) in foundations to obtain an even bearing or platform for a wall. Thus the overturned Roman walls of Burgh castle, Norfolk, show the marks of planks 2 ins. thick, laid on a bed of chalk and lime, to receive the flint work set on a bed of coarse mortar; BUILDER *Journal*, 1847, v, 383. It is now superseded by CONCRETE.

WEATHER BOARDING is a species of planking. CLINKER BUILT.

PLANK ROOF. A roof formed of ribs or trusses made up of two or more planks placed either side by side, or placed above

one another and curved into the form required. These systems are explained s. v. LAMINATED RIB and *Illustrations* s. v. Girder: BENT TIMBER, and *Illustrations* s. v. GIRDER (Truss).

Hookey's mode of bending timber, *Trans.* of SOCIETY OF ARTS, xxxii, 95. Holdsworth's roof in same *Trans.*, xxxviii, 62; and in LA PROPRIÉTÉ *Journal* for 1833, p. 134, pl. x. Great Northern Railway Station in London; BUILDER *Journal*, 1852, x, 626; replaced 1869 by iron arc girders. Riding house for the prince de Montebelliard in Alsace, in KRAFFT, *Jardins de France*, fol., Paris, 1809, i, pl. 35. Examples of laminated ribs in KRAFFT, *Charpenterie*, fol., Paris, 1819-22, pt. iv, pl. 25; and pt. v, pl. 5 and 17: in KRAFFT, *Charpente*, fol., Paris, 1805, pl. 8. Several in ROMBERG, *Die Zimmerwerke*, 4to., Leip., 1840-50, pl. 117, etc.; 127, etc. A collar roof at East Horseley church, C. E. *J.*, xii, 222; B. *J.*, p. 284, 297; HAY'S NICHOLSON'S *Carpenter's Guide*, 320 and 340. Church roof at Grassendale, in NEWLAND, *Carpenter's Assistant*, pl. 29. Leeds Town Hall, B. *J.*, 1858, xvi, 678. At Paris, ALLG. BAUZEITUNG, 1st ser., pl. 578.

CUBITT, *On a new mode of covering roofs with planking*, describes it as formed of boards cut by a circular saw from planks 7 ins. by 2½ ins., laid in such a manner that each plank makes two boards, as read at INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1840; and CIVIL ENGINEER, ETC., *Journal*, iii, 424.

Roofs are often now finished for slating by 1¼ in. or 1½ in. planks nailed on to the purlins, diagonally or longitudinally.

A small *dome* formed of thick planks laid in courses; KRAFFT, *Charpenterie*, 1819-22, pt. v, pl. 27. A *flat* formed of planks as joists, is shewn in *Annales de la Construction*, 1857, iii, pl. 46. A *truss* of planks in 1858, iv, 31.

PLANSHEETS and playnsherttis; see SAWING of timber.

PLANTA GENISTA; the whin or broom. It was ordinarily used in the middle ages for strewing floors, and became an emblem of humility. It was borne as such by Fulke, earl of Anjou, grandfather of king Henry II of England, in his crusade to the Holy Land. It was adopted by the house of Plantagenet in armour, decoration, etc.: HUNT, *Tudor Arch.*, 119. 14.

PLANTATION. Plantations are of two sorts, boundary and ornament. The proper arrangement and disposition of these are treated in PAPWORTH, *Ornamental Gardening*, 8vo., London, 1823. Much of the success of a plantation depends on the proper adaptation of species to the soils and situations most suitable to them; remarks on these are given in PENNY CYCLOPÆDIA, 1840, s. v. Planting. LOUDON, *Country Residences*, 4to., London, 1806, ii, 510-5. QUARTERLY REVIEW, March 1828, No. 74. *Plantations d'Alignement* for roads, avenues, etc., and quinconces, in ANNALES DE LA CONSTRUCTION, fol., Paris, 1856, ii, pl. 22. DALY, *Revue Générale*, v, vi, and xxi. Publications named s. v. LANDSCAPE GARDENING and ORNAMENTAL GARDENING. 14.

PLANTERI (.....), designed 1729 at Turin, the palazzi Benso di Cavour; Spigno and Paesano. STEFANI, *Torino*, 8vo., Turin, 1852.

PLANTING. The disposing of the first courses of solid stone on the foundation, laid level with all possible exactness. 4.

PLASENCIA or PLACENCIA (anc. *Ambracia*). A city of Estremadura in Spain, situated on the river Xerte or Jerte, over which are several bridges. The wall with 68 semi-circular towers built 1190-97 has six good gates. The aqueduct has arches of great height. Plasencia is the see of a bishop. Of the cathedral dedicated to the Virgin, the capilla mayor was designed 1498 by J. de Alava; the edifice was continued by R. Ezguerra (died 1561); the north *puerta* del Enlosado is Berruguetesque; the façade is in the plateresque style, as is the portal to the sacristy; the noble south portal is of granite. The elaborate *silleria del coro*, the bishop's throne, and the confessional, were carved by R. Aleman; and the *retablo* 1626 by G. Hernandez. The chapter house was burnt April 1832. Many tombs in the church of S. Nicolas, in the Monjas de S. Ildefonso, in S. Vicente, 1597 one of the finest in Estremadura, and in S. Juan Bautista, deserve attention. The *casa de las Bovedas*, built 1550 for the marquis de Mirabel, is now attached to S. Vicente; its court, saloons, and cloistered terrace deserve attention; as do also the *casa* of the marquis of Santa Cruz de Paniagua; and of the bishop; with the large town house having prisons on the ground floor. FERNANDEZ, *Hist. y Anales de Plasencia*, fol., Madrid, 1627. The noted bridge of Alvalat, near the city, known to be the work of a Dominican, was executed from the designs of J. de Alava, and under his superintendence. 28. 50. 66. 96.

PLASHING or SPLASHING. The manner of treating a quick-set hedge to make it fill up with new wood. Some of the standards are cut partly through near the roots with a sharp hedge knife, and then laid in a diagonal position, the tops being held in place by a binding of hazel rods twisted together and secured to the heads of stakes driven into the ground. New shoots spring from the cuts, which in time form a thick and substantial fence. 4. S. J. B.

PLASTA. *πρότυπα*, in later times called *προτέγισμα*, is given as the proper term for the antefixa, or ornament, which formed the end of the joint tile; but it may be deemed doubtful whether *πρόστυπα* be not the word intended by BATISSIER, *Hist. de l'art mont.*, 4to., Paris, 1845. MAZOIS, *Pompeii*, fol., Paris, 1812, i, 57. ANTEFIXUM. HARMOS. IMBREX. PERSONA.

PLASTER, written PLAISTER from before 1745 to as late as 1783. It is usually formed of burnt limestone or quicklime, mixed with ox or cow hair. Old plastering is found to have had rye straw mixed with it for binding, and was very strong. Its composition and name vary according to its uses: each sort is explained in detail in this work. A brown substance somewhat like plaster, but full of fibre, was in use in XVI cent.

PLASTER CAST. The result of plaster of Paris or gypsum mixed with water, run in a mould, allowed to set, and then removed from it; thus a copy or cast of the original is obtained, as a bust, a figure, an ornament, a moulding, and such like. In casting, great care must be taken to get rid of air bubbles. These arise from two causes; either from the adhesion of the air to the plaster, or from the plaster carrying down air with it when added to the water. The mould having been slightly brushed over with olive or salad oil, is then carefully rubbed over with fluid plaster by a hog's bristle painting brush, and the prepared plaster having been mixed with water to the consistence of cream, is poured in to a desired thickness; in a few seconds of time it will have set; then it may be removed from the mould and allowed to dry; or gently heated to give off the moisture. SMEE, *Elements of Electro-Metallurgy*. CIVIL ENGINEER, ETC., *Journal*, 1841, iv, 56. BUILDING NEWS *Journal*, etc, 1876, xxx, 26. Formerly, plaster casts were usually executed as sharp and with as much relief as when done in stucco work by hand, certain portions being cast separately and fixed on the lower parts; or the mould was made in several pieces, as for a bust, etc. But about 1850 the practice of "jelly moulding" came in, which superseded the casting in plaster, rosin, or lead, moulds. The jelly mould being all in one piece, a cast from it is not to be compared with the former work. Also, in order to make the cast leave the mould before it heats, as in that case it would spoil the mould, the plaster is gauged with alum water to make it stiffen quickly; in time, the alum, if too strong, will work its way to the surface and destroy the paint. BUILDER *Journal*, 1856, xiv. CARTON PIERRE. PAPIER MACHÉ. 6.

Sig. Abate of Naples found that by combining plaster with the minimum quantity of water by the application of steam, filled into moulds and submitted to hydraulic pressure, the cast became as hard as marble and as susceptible to polish. If plaster casts are saturated with paraffin in lieu of stearine or common paint, a fine surface will be given to them.

A *plaster coping* for walls was recommended 1760, and is described in DOSSIE, *Memoirs of the Society of Arts*, Agriculture, 8vo., London, 1771, ii, 16-9.

PLASTERER. (Low Lat. *torchiator*, BRAYLEY, *Palace of Westm.* p. 123.) The London Assize of 1189 mentions "mud plasterers, torchers (*i.e.* cob-wallers)"; that of 1212 plas-

terers and whitewashers (*dealbatores*); TURNER and PARKER, *Dom. Arch.*, 1852, i, 25, and i, xxvi; wherein (i, 60, 71) occurs 1825, "et in feno ad plausturam aule"; 21 Henry III, "dauburam et lambreschuram" (184); and "plastricio" or plaster work (185, 231). NECHAM, XII cent., alludes to the smoothing of walls by the trowel: and in a building scene of the XV cent. men are plastering the outside of a wall with a trowel, Harl. MS., 2278, fo. 28*b*. 1353-75, "plastrer", in LIBER ALBUS, p. 553-4; 728. 1403-4, "plasterer", *York Fabrick Rolls*, 23-7; and in contract 1525-38 for Hengrave Hall; GAGE, *Hengrave*, p. 42. A tomb at Sens, of a supposed painter in fresco, showing in a bas-relief plasterers at work, is given in DALY, *Revue Générale*, 1854, xii, 146-9.

In 1501 king Henry VII incorporated the London plasterers into a guild. The act 1603 1st James I, c. 20, enacted that no plasterer should exercise the art of a painter in the city or suburbs, but an apprentice was exempted; yet they might use whiting, blacking, red ochre, etc., mingled with size only. By an act of Common Council, 6th William and Mary 1694, those practising the art of plastering without being a member of the guild could be fined. BUILDER *Journal*, 1860, xviii, 357; xxi, 248. The Lansdowne MS. 487 in the British Museum, consists of "the plaisterer's objections to the antiquity of the painter's company".

The term was in use in 1750, as by Wilton, who was a sculptor or carver, or statuary, and also plasterer. The work executed was chiefly the ornamental decorative work in plaster worked by hand on the walls and ceilings.

PLASTERER'S TOOLS and implements. They consist of a *spade* or *shovel;* a *rake*, called a *hair hook*, having prongs bent down for mixing the hair with the lime; the *setting* and gauging *trowels*, floating rules, and running rules for running cornices; the *angle float* or flote; the *darby; rules* called straight edges; *stopping, smoothing*, and *picking out*, tools; wood *moulds;* the *hawk*, for holding small quantities of plaster; the *server*, used by the plasterer's boy to convey the stuff from the banker to the hawk; *brushes*, chiefly for throwing on water in forming stucco work, and for wetting old plastering before repairing it; *pails* for water and for whitewash, and a *budget* or pocket to hang at the side to hold nails in lathing, or the *apron* is tucked up for the purpose; and a *lathing hammer*. MOXON, *Mechanick Exercises*, Bricklayer's work, 4to., London, 1700, p. 12-14. DONALDSON, *Stucco*, in *Encyc. Metrop.*, 1840, plate. 1.

PLASTERER'S WORK, or PLASTERING. (Fr. *chape*; Ger. *ueberschutt*.) To *walls*, plaster work, in common work where floating is not used, is termed *laid work* or *render;* if *putty* be used for a second coat it would be termed *laid and set*, or "two-coat work", or "render set" (Fr. *enduit* for the two). In "three-coat work" (Fr. *crepis*) a "floated coat" is put on between the rendering and the setting coats, and is then called *render float and set*.

ROUGH CASTING (Fr. *crepis moucheté*) is done on walls and on laths. "Quidam parietes amāt loricatos, et tectorio vestitas, quidam gypsum inducunt, quidam albaria grūmulis aspergūt, quidam puncturis distingunt, quidā malthaeos connestiunt. Some men will have their walls plastered, some pergetted, and whytlymed, some rough caste, some pricked, some wrought with playster of Paris"; HORMANUS, *Vulgaria*, 4to., London, 1519, fol., 241.

Defective outside plastering may arise from the joints of the brickwork not being sufficiently hacked out to admit adhesion to the bricks—want of sufficient wetting to arrest the too great suction of the bricks, or from the first coat getting too dry before the finishing coat is applied—want of sufficient thickness in the compo laid on—and possibly the nature or mixture of the material itself; that is the compo or sand may not have been good or not properly proportioned to each other, or well mixed with use.

For *inside work*, as to timber partitions and ceilings; they are first *lathed* to receive a *laying* or *plastering*, which alone does for inferior rooms or cottages. It is called *lath lay;* and is the FIRST COAT of "two coat" or set work, and the surface is only swept with a broom to form a key for the second or "set" coat, being plaster with a little gypsum. This work is called *lath lay* or *plaster and set*. FREIZING. The first coat should be quite (white) dry before the floating is put on, in order that the cracks which always appear in the first coat may be quite opened before the next coat is put on. In "three coat" work this first coat is called *pricking up coat*, which is formed of "coarse stuff", and is scratched or scored over with the end of a lath (not a trowel) to form a key for the *floating* coat, which is better not quite dry before being finished with a *setting* coat without hair, when to be papered over. It is called "lath render float and set for paper". When to be *painted*, BASTARD STUCCO of three coat work is done, as follows:—First coat, render in coarse stuff; second coat, the same, not hand floated; third coat, float in fine stuff in proportion of two of sand to one of plasterer's putty, and then hand-floated to a grit with water and trowelled down smooth. This is called "lath lay float and set for paint". The best work for paint is called "trowelled stucco", or "best stucco", which is done the same, but with extra trowelling to bring to a very smooth surface. The whole flank between the angles is trowelled off continuously, so as not to show a joint or break in the work, as, if allowed to get dry during the operation, the joints always show. CEILING. COATING. DAUB. EXPANSION. 1. 14. 25.

DINSDALE, in CIVIL ENGINEER, ETC., *Journal*, 1845, vii, 313, advocates that all plastering is best done at one time; that the walls should be thoroughly dry before the work is commenced, or it will be liable to scale and blister off; the necessity for carefully "keying" each coat for the ensuing one; and regulating the quality of the sand, in decorative work.

In Dublin (1819) plasterer's work to *ceilings* was called "lath, scratched, floated, and (full) coated"; to *walls*, "scratched, floated, (troweled and full) coated". The last is lime as in "set" work; for inferior work a very thin coat of white was put on, called "skimming".

100 yards of *render set* requires $1\frac{1}{2}$ hundred of lime, 1 double load of river sand, and 4 bushels of hair (or 150 pecks of lime, 16 pecks of hair); for the labour, 1 plastererer, 1 labourer, and 1 boy, each three days; and upon this 20 per cent. profit is usually allowed.

130 yards of lath plaster and set—1 load of laths, 10,000 nails, $2\frac{1}{4}$ hundred of lime, $1\frac{1}{2}$ double load of river sand, 7 bushels of hair; for the labour, 1 plasterer, 1 labourer, and 1 boy, each 6 days; and upon this 20 per cent. is usually allowed. 1.

Thickness of Compo	Inch	$\frac{3}{4}$ inch.	$\frac{1}{2}$ inch.
1 bushel of cement will cover	yards	$1\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{1}{4}$
1 ditto and 1 of sand ditto	,,	$2\frac{1}{2}$	3	$4\frac{1}{2}$
1 ditto and 2 ditto ditto	,,	$3\frac{1}{2}$	$4\frac{1}{2}$	$6\frac{1}{4}$
1 ditto and 3 ditto ditto	,,	$4\frac{1}{2}$	6	9
		(*$\frac{3}{4}$ inch is the usual thickness.*)		
1 cwt. of mastic and 1 gallon of oil	,,	—	$1\frac{1}{2}$	$2\frac{1}{2}$

1 cubic yard of chalk lime, 2 yards of road drift or sand, and 3 bushels of hair, will cover 75 yards of *render and set* on brick, and 70 yards on lath, or 65 yards *plaster or render 2 coats and set* on brick, and 60 yards on lath; floated work will require about the same as two coats and set.

1 bundle of laths and 500 nails will cover about $4\frac{1}{2}$ or 5 sup. yards.

1 bundle of laths contains nominally 500 feet.

The weight of a yard superficial of lath plaster float and set ceiling of good quality is about 98 lbs. If of inferior quality it would be about 8 lbs. less. W. C.

A table of the *Quantity of Materials used in Plastering* for each superficial yard, is given in HURST, *Arch. Surveyor's Handbook*, 12mo, 1865, p. 207.

6 lbs. of hair to 1 of mortar for top stuff, and the finishing coat sometimes set with white hair: the last made of one-third plaster of Paris, and two-thirds lime putty.

The materials principally used by plasterers consist of:—COARSE STUFF for the *rendering* or *pricking-up* coat; it is made of common lime and hair (Fr. *blanc en bourre*). FINE STUFF for the setting coat, of pure prepared lime, with a little sand, but now no hair. GAUGE STUFF, or fine stuff and plaster of Paris. STUCCO is prepared lime with sand well worked with the *hand* float and water: or of plaster. GYPSUM, or plaster of Paris, is used for the mouldings, decorations, and mixing with lime to form gauge

stuff. *Plaster mortar*, made of calcined alabaster or gypsum. WESTMACOTT's prepared patent carbonate, combining lime with unburnt limestone or chalk, suitably ground or reduced to powder. LIME PLASTER. A RENDERING PLASTER by A. G. Barham, of Bridgewater. Scott's patent SELENITIC CEMENT MORTAR.

Sarel, of Paris, invented a plaster said to be superior to plaster of Paris; a coat of oxide of zinc mixed with size made up like a wash, is first laid on the wall, ceiling, or wainscot, and over that a coat of chloride of zinc applied, being prepared in the same way as the first wash; the oxide and chloride effect an immediate combination, and form a kind of cement, smooth and polished as glass, and possessing the advantages of oil paint without its disadvantages of smell. Rosenthal and Co.'s *new plastic material and process*, is said to supersede common lime and hair plastering; the work may be rendered one day, floated the next, and finished the third day; it sets hard and will not crack. Dixon's *improved patent laminæ*, in sheets, was introduced 1861, as a substitute for plastering: Hitchin's patent rapid slab plastering, 1876; no lathing; no waiting: and Manchester patent plaster foundation company, in 1866. PUGGING, to prevent sound. SCAGLIOLA. MAREZZO MARBLE. KEENE, MARTIN, and PARIAN CEMENT. HYDROBORANATED PLASTER. STUCCO or finished plaster. MASTIC. LUKIUM, or Turkish plaster. CHUNAM, or Indian plaster. 25.

PORTLAND CEMENT is sometimes used on lath work, but it is difficult to obtain a very smooth surface free from hair cracks. A little Roman cement has been used in the setting coat. Two or three parts of sand only is recommended. Where time is an object, a safe method is to gauge the first two coats with a small proportion of Portland cement, and then set in the ordinary way with putty gauged with plaster.

The prices of plasterer's work done 1666-67 under Sir C. Wren are given in BUILDER *Journal*, xii, 567. Plastering in 1700 is stated to have been,—"of loam on both sides of a wall; lathed and plastered with loam and a coat of rough mortar outside; white lime and hair on both sides of a wall. To ceilings, lathing, plastering, and finishing, reed, lime and hair. Rough mortar or rough cast, in Kent, on old loam walls. In imitation of brickwork, by mortar of brick powdered, sharp sand, lime, and some red ochre". "Plaisterer's work" in 1745 and 1755, consisted of:—"Grey plaister floors, $2\frac{1}{2}$ ins. thick. Red do. Stoco on fir lathes; on oak lathes. Stoco on brick walls. Floated ceilings: common, not floated. Floated rendring; common rendring. "Rendring on groins": and "Ornamental plastering"; SALMON, *Vade Mecum*, 8vo., London, 1755, 3rd edit. revd. CLARKE, *The Plaisterer's Bill*, 8vo., London, 1783, for work done at Somerset House under Sir W. Chambers, by him and his late partner Thomas Clarke, the king's patent plaisterer.

Plasters and Cements in use in 1845, BUILDER *Journal*, iii, 160: And in 1870, ARCHITECT *Journal*, iii, 245; 291. *Improved plastering for brick walls*, as premiated in Prussia, BUILDER *Journal*, 1875, xxxiii, 772. *Effect of Charcoal on Plastering, and remedy*, BUILDER *Journal*, 1873, xxxi, 91, etc. *Plasterers' Laths and Plastering*, BUILDING NEWS *Journal*, 1867, xiv, 379; 1871, xx, 152; *Fall*, 1870, xix, 375, 460. *Plastering, Measuring and Quantities*, 1873, xxiv, 354-5, by FLETCHER, and his *Quantities*, etc., 8vo., London, 1877. *Plastering* in *Nicholson's Masonry*, edit. by DOBSON, 1852. DEMPSEY, *Builder's Guide*, 8vo., London, 1851, p. 29.

A new fireproof plaster, with experiments, is detailed in CIVIL ENGINEER, ETC., *Journal*, July 1838, i, 255; and Beale's patent fireproof cement in 1853, xvi, 311; and BUILDER *Journal*, xi, 508. A mortar said to be capable of resisting fire for a long time, is mentioned by HOSKING, *Healthy Homes*, 8vo., London, 1848; new edit. 1849. After the conflagration at Paris, it was generally found that with good plaster work over them, beams and columns of wood were entirely protected from fire. In cases where limestone walls had been ruined on the outside by the flames passing through the window openings, the same walls, internally, escaped almost unscathed, owing to their being coated with plaster. Stone staircases well protected by plaster were fireproof, although not so safe as wood in case of heavy débris falling upon them. BUILDING NEWS *Journal*, 1872, xxiii, 213. EDIS, *Notes on the late Fires in Paris*, read at Roy. Inst. of British Architects, May 1871, June 1872.

PLASTER (FINE). A plaster manufactured from the purest and best coloured portions of GYPSUM, burnt in ovens, and finely ground in a mill. FLOOR PLASTER is a coarser quality. S. J. B.

PLASTER FLOOR. (Fr. *composte.*) A floor of plaster and of lime-ash, or with other substances, has been known for some few centuries for its lasting qualities, dryness, incombustibility, and in some places for cheapness. Of the original lime ash floor in Wintringham church, Lincolnshire (? Decorated period) much still remains; ASSOCIATED SOCIETIES, *Reports*, etc., 1878, xxxii. In the survey 1577 of the bishop of Durham's house at Howden, in Yorkshire, it is stated "that the plaster floores of certen lodginges—are in decay", with the ovens in the kitchen, to the value of 1s. For ground floors, a composition of burnt clay and sharp sand mixed with bullock's blood, well beaten together and spread out upon a level surface makes a beautiful and firm floor; it will also serve as plaster for a wall; Sir Hugh PLATT, *Jewell House of Art and Nature*, 4to., London, 1594. Plaster floors made of *lime and coal ashes* were made at Bath as early as 1788, and cost 9d. per yard: also in Dorset, Somerset, and Devon from before 1800; their manufacture is detailed in BUILDER *Journal*, 1849, vii, 6; 29. CIVIL ENGINEER, ETC., *Journal*, 1849, xii, 64. BREES, *Glossary*, 1853, s. v. Fireproof. For best groundfloors and malt-houses, of lime and coal ashes and clay; also a cheaper floor of loam, horse dung, and coal ashes; LOUDON, *Villa Architecture*, 8vo., London, 1842, § 585. The better floors can be made to receive a fine polish: BUILDER'S DICTIONARY, 8vo., London, 1734, s. v. Floor. Lime, river sand, and gun dust or anvil dust from the forge, make a firm floor on which to make malt. METALLIC LAVA. 2. 4.

The method of making hard lime floors in Mexico, and for the roofs of houses, was explained by gen. ELLIS, in a paper read at the American Society of Civil Engineers, and printed in BUILDER *Journal*, 1873, xxxi, 449.

Fireproof floors are finished on the concrete by a coat of *Portland cement;* MOSELEY, in Royal Inst. of Brit. Architects, *Sessional Papers*, 1861-62, p. 114; 119-20, with subsequent remarks on plaster floors. Garden paths and floors to sheds, are recommended to be formed in cement; GARDENERS' WEEKLY MAGAZINE; and BUILDER *Journal*, 1862, xx, 848.

PLASTER OF PARIS; see GYPSUM.

PLASTER WORK, or DECORATIVE PLASTERING. The Egyptians covered their granite sometimes, and sandstone always, with a very thin coating of stucco as ground for painting. Many of the Greek temples built of a coarse stone, were also faced—in several places the plastered portions are now in better preservation than the others; this was particularly the case at Agrigentum. Prof. Donaldson found the outside face of the cella walls of the Theseium at Athens, wrought with a point, as though prepared for the reception of a thin coating of plaster. Stucco on brickwork for painting was extensively used at Pompeii. The Romans largely used plaster incrustations. The Romanesque builders did much the same as their predecessors; and in Gothic work many examples will be found; while the *Rolls* give numerous instances of orders for such work to be done, inside and outside. Vaults as constructed with small bricks, or stones cut in the form of bricks, *temp.* Henry III, were covered with a thin coat of plaster, and called *chape* (VIRLOY, s. v.), and is of the same kind called by VITRUVIUS, *lorica testacea*: ESSEX, *Collections* in Brit. Mus., Add. MS., 6769, p. 110. The mediævalists plastered the inside of their houses, where the walls were of rubble; the external walls, if of ashlar, were sometimes left bare; thus only two or three sides of a room were alike. A thin layer of fine plaster, about $\frac{1}{8}$ inch thick, was used at Little Braxted church, Essex (transitional Norman), to the rubble walls to keep out the weather. The moulded brick windows in the churches of XV cent. were generally plastered to resemble stone; BUCKLER,

Churches of Essex, 8vo., London, 1856, p. 175: and as at Layer Marney Hall, Essex. Good plastering between wooden ribs, in imitation of vaulting, is seen in some Second Pointed work at Rochester cathedral.

The grange or manor farm, the residence of the inferior gentry in the XV cent., is exemplified in the grange at Whalley, Lancashire. In these half timbered houses, to produce an equal effect throughout the exterior, the entire surface of the walling and framework was cased with a durable plaster called "rough cast", made of lime, hair, and coarse sand or small pebbles, sometimes studded with fragments of glass: the timbers were often left uncased and often painted a dark colour; HUNT, *Tudor Arch.*, 4to., London, 1836, p. 72, 179. In Kent, BUILDING NEWS *Journal*, 1871, xx, 501. The compartment work of the ceilings of the Elizabethan period, with the plain plaster work to the walls above the tapestry of the preceding period, and of the wainscot work of her reign, was followed by the heavy panelled work of the Stuart period, which appears to be due to the Italian masters preceding Buonarroti and Raffaello, whose pupils followed their lighter style (as will be seen in the *Illustrations*, pl. 3), and in the works of TAYLOR and of CHAMBERS: the painted Italian and French plain ceilings hardly require any notice. Another style of plaster ceiling was introduced by the Italian workers in stucco, whose foliage, etc., is found in buildings erected by Le Pautre and Gibbs. This was worked entirely by hand, and lingered in England in the structures designed by Stuart, Adam, Chambers, and Wyatt, until the beginning of the present century, when the occupation began to be superseded by casting in plaster. Ireland, however, had a fine school of ornamental modelling in cornices, coves, and ceilings, existing for a quarter of a century longer; and it has been revived in Italy, and later in France. In 1736 it was said "plastered *ceilings* are much used in England beyond all other countries, and they have these conveniences with them: they make the rooms much more lightsome; are excellent against raging fire; stop the passage of the dust; and lessen the noise overhead; and in summer time the air of the room is somewhat cooler"; HARRISON, in HOLINSHED, *Chronicles*, fol., 187. FRET WORK. PANE DRAWING. PARGET WORK. Plastered *partitions* commenced about the end of XVI cent.

TURNER and PARKER, *Domestic Arch.*, 8vo., Oxford, 1851, i, xxv, 15. *Use of Plaster in Architectural Decoration*, in CHURCH BUILDER *Journal*, 1876, p. 43; and 1874, p. 116. ASSOCIATED SOCIETIES, *Reports and Papers*, 1874, lxxvii. BUILDER *Journal*, 1869, xxvii, 497-8. At the new Provincial Bank at Dublin, BUILDING NEWS *Journal*, 1866, xiii, 444. *Decorative plastering, idem*, 1871, xx, 45; and 1875, xxix, 499, 546. Ferrey's stamped or incised stucco, Royal Inst. of British Architects, June 1857; and CHURCH BUILDER *Journal*, 1863, ii, 6. Impressed plaster work, BUILDING NEWS *Journal*, xx, 194; (Fr. *estamper;* 25.)

In Italy, a system of building is noticed by VASARI in life of Bramante, "di mattoni e di gettò con casse, le colonne e le bozze di opera dorica e rustica", and in MILIZIA, *Memorie*, "con colonne fatte di getto; invenzione allora nuova, e con bozze d'opera rustica su l'ordine dorico"; VASARI terms it "cosa molto bella ed invenzion nuova del fare le cose gettate". The real meaning of the words here quoted may be explained by the operation which this writer says Bramante employed, "buttar le volte (di getto) con le casse di legno, che intagliate vengano co' suoi fregi e fogliami di mistura di calce"; MILIZIA gives "gettò le volte con casse di legno, che intagliate vengono co' suoi fregi e fogliami di mistura di calce"; and VASARI states that G. da San Gallo took from Rome to Florence the system "gettare le volte di materie che venissero intagliate," and applied it in a saloon at his own house, as well as in the great hall at the villa called Poggio a Cajano; in the latter building the ceiling, which is 163 ft. long by 68 ft. wide, is flat, with thirty-nine compartments, according to a note in the English translation of MILIZIA, who calls it a vault, as does VASARI. From the *Introduzione* (Architectura, cap. iv and vi) of VASARI, *Vite*, which has been too much neglected because it occurs between the two proemiums, it appears that the invention (called in Italy building *à cassetta*, as explained by BONNANI, p. 68) consisted in forming the backs of the centres to the required shape and section by wooden moulds to be filled in the proper places with cast ornaments, and depositing the plaster upon the moulds as a bed for the brickwork; on removing the centres, the ceiling appears finished, and might authorize the expression "in one piece". The method "del buttar le volte di gettò" and "lo stucco" are specially noted by VASARI as two things which were practised by the ancients, but lost until revived by Bramante.

Plastering is now carried to great perfection in Italy; rooms are so finished, that no additional work in the shape of house painting is required, the polish of the plaster and its evenness of tint rivalling porcelain. Scagliola is the material chiefly used. The new ball room at the palazzo Pitti at Florence, including mouldings, figures, bas-reliefs, and ornaments, was executed for 2 crowns for each 4 feet sup.; WILSON, *On the state of the Arts in Italy*, 1840, in *Edinburgh New Phil. Journal* for January 1841; and CIVIL ENGINEER, etc., *Journal*, iv, 37.

In French domestic edifices of XIV cent. an instance occasionally occurs where the lower part of the building is of ashlar and the upper part of rubble faced with plaster; VIOLLET LE DUC, *Dict.*, s. v. *platre*. During the Renaissance period, some beautiful buildings were treated in plaster work.

In Spain, the walls of the front of the alcazar at Segovia, and several other examples in the town, are diapered in plaster. "They are generally tracery patterns of the latest Gothic (XV cent.), repeated over and over again, so as to produce a regular diaper throughout. This kind of decoration seems to be perfectly legitimate. A tower in the walls, with stone quoins and banded 2 courses in height of brickwork at intervals of about 3 ft.; has the walls plastered and diapered between the bands. At Toledo, the capitals of the columns in the (synagogue XII cent. but 1405) church of Sta. Maria la Blanca are of brick plastered, exceedingly elaborate.—All the Moorish decorative work seems to have been executed in the same way in plaster, of very fine quality, and evidently cut and carved as if it had been stone, and seldom, if ever, I think, stamped or moulded, according to the mistaken practice of the present day; there is an endless variety of design everywhere"; STREET, *Gothic Arch. in Spain*, 8vo., London, 1865, p. 192, 194, 217-8. CORBEL WORK OF CEILINGS.

The walls of the rooms at Kandahar were plastered with gypsum and decorated along the cornices and around the recesses that serve for shelves and as cupboards, with arabesque patterns stamped on whilst the plaster was moist. Over this decoration, in its yet moist state, had been sprinkled coarsely-pounded talc, which during daylight shone like frosted silver, whilst by lamplight it sparkled so that it made the room not unlike the icy grottoes on a theatre stage; BELLEW, *Journal of a Mission to Afghanistan in* 1857, 8vo., London, 1862.

PLASTIC (Gr. *πλασσω*, to form; Fr. *plastique*). A term applied in speaking of the art of modeling, which is sometimes called the "plastic art", or sculpture; whereas "graphic art" is design or drawing. G.

PLASTIC CLAY. The lowest formation of the tertiary strata; it is found from 100 to 400 yards in thickness, is of variously coloured sands and clays, the latter containing organic remains identical with or much allied to those of the London clay. The plaster clays were usually covered by a stratum or bed of silt, containing shells, shark's teeth, etc., and upon this rested the strong blue London clay. Bricks are made from this deposit, as at Arundel. BUCKLAND, *Geology, etc.*, 8vo., 1847.

PLAT, PLATTE, PLOT. A plan, drawing, or pattern. A term used in the mediæval ages when referring to instructions for the execution of works. "In the *plat* made for the same chapel", occurs in the will of king Henry VII; BRITTON, *Arch. Antiq.*, ii, 16. "After the fourme of a platte therfor devised," referring to King's College Chapel, Cambridge; *idem*, i, p. 5. "For projection of plattes;" RECORDE, *Pathway to Knowledge*, 4to., 1551.

HORMANUS, *Vulgaria*, 4to., 1519, p. 243. "A plat of Hastings and Rye," Privy purse expenses of king Henry VIII. "A platt of an upright" was a new year's gift 1605-6 from Sir D. Coningham, surveyor of the king's works, to king James I, who gave him in return 12 oz. of gilt plate: NICHOLS, *Progresses*, 4to., London, 1828, i, 596. 19.

PLATANUS Occidentalis. The Plane tree, called by the Americans Button wood, from the curl in the wood. It is a native of North America, abundant on the banks of the rivers Ohio and Mississippi, and attains to 12 ft. diam. The colour of the wood resembles beech, but is softer. It is not much used for furniture, as it warps easily and does not polish well. When thoroughly seasoned it is useful in interiors, and for sheathing or lining timber frames of houses; it speedily decays when exposed to the weather. The P. orientalis is a native of the Levant and of the Eastern countries. It is called *lace wood* from the beauty of its septa. It is smaller and more ornamental than the above. The timber is fine grained, hard, and well suited to such kinds of joiners' work as do not require strength, as it is very brittle. When old the wood assumes the appearance of walnut wood. In Persia, where it is called *chinar*, it is used for doors, windows, and furniture, ornamental cabinet work, and turnery. A fine avenue of the P. orientalis was planted 1597-8 at Ispahan. PLINY, *H. N.*, xii, 3-5, mentions several trees in Italy of an enormous size, and as planted for shade; one tree still growing in the valley of Buyukdere, near Constantinople, was (1830) 150 feet in circumference, with an internal cavity of 80 feet circum. This species was formerly considered to thrive better than the other in the London parks and squares. Both have the singular property of throwing off the old bark, and hence are so valuable in towns. P. occidentalis has been planted throughout the Thames embankments, forming the avenue; because this variety grows more upright, and much more vigorously than does the other, of which the habit is more horizontal. It is also very largely employed in avenues in Paris; while there, the P. orientalis is used for single trees or for groups, on lawns, etc. ALPHAND, *Les promenades de Paris*, etc., fol., Paris, 1867-73. Acer pseudo-platanus is the Sycamore.

MICHAUX, *North American Sylva*, 8vo., Phil., 1817, ii, 55; new edition, 1871. CIVIL ENGINEER, etc., *Journal*, 1841, iv, 268. STEVENSON, *Civil Engineering of North America*, fol., London, 1834. HOLTZAPFFEL, *Des. Cat.*, 8vo., 1843, p. 101-2. LOUDON, *Arboretum*, 8vo., 1838, iv, 2033. DOWNING, *Landscape Gard.*, 8vo., 1849, p. 158. 14. 71.

PLATBAND, from Fr. *platebande*. An architrave, or architrave and frieze, or string, if in one stone. Besides the stone examples quoted s. v. Architrave, PATTE, *Mémoires*, 4to., Paris, 1769, p. 304, pl. xvi, gives the method in brickwork, invented by de Lamotte (or Vallin de la Mothe) in Russia. A *platebande* as invented by Philo of Byzantium, is given in DALY, *Revue Générale*, 1873, xxx, 76.

The term is also applied to any flat and square moulding whose projection is much less than its height: such are the fasciæ of an architrave, the listel between flutings, etc. In some places to the lintel of a door, or of a window, when it is made square and not much arched; also to a wall plate; and is even synonymous with IMPOST and ARCHIVOLT, as the plain band or capping, from which springs an arch, as to a door post, arcade, etc. 1. 2. 5. 6. 25.

An enriched platband under an architrave appears in two mausolea at Palmyra; and in the façade of the tomb of the kings of Judah, in Syria; given in CASSAS, *Voy. Pitt. de la Syrie*, fol., Paris, 1799, pt. i, pl. 134 and 137; pt. iii, pl. 22.

PLATE or TASSEL (Lat. *chelonium*; It. *anello*; Fr. *amarre*; *sabliere*). A long piece of timber prepared and bedded in, or on, a wall, for the purpose of receiving the ends of floor joists and the ties of a roof; it is generally flush with the inside face of the wall. Plates are now often carried clear of the wall on stone or iron corbels, or on sets off, in order to prevent their decay, when set in a wall. The plates should be well lapped and spiked at the joinings and angles; at the roof they are connected at the corners of the building by diagonal pieces and ties. VITRUVIUS, x, 2 and 15. DRAGON TIE. TEMPLATE. A piece of timber upon which some considerable weight is framed; hence GROUND PLATE, window plate.

Where thin walls are built, tiers of bonds, or plates, were formerly used, which assisted in strengthening them and steadying them while green. In a thick wall they have been bedded in the centre of it; but, when they decay from damp or age, the wall settles from the giving way of the slight work usually formed on each side of the plate. BOND. CHAIN BOND. The plate is now superseded by HOOP IRON BOND.

PLATE CLOSET or ROOM or SAFE. A fire-proof place for the custody of plate, arranged with cupboards, sliding trays, shelves, and boxes, for holding the various articles. The door often opens out of the under-butler's or butler's bedroom, who has to guard against the theft of the articles under his charge. PLATE SCULLERY, is a separate room for cleaning the plate where there is much of such work to do. It will open of course from the pantry alone, and contain the usual pair of sinks and a dresser. KERR, *Gentleman's House*, 8vo., London, 1865.

PLATED GLASS. In stained glass work, is where two sheets of glass are united. WINSTON, *Inquiry*, 8vo., Lond., 1847, p. 15.

PLATE GLASS. This, the best quality of glass, is distinguished from sheet and crown glass by the method of manufacture; it is not blown, but is cast, the molten metal being poured out on a plane iron table, spread out by a roller; then annealed and polished. The metal used is of the best description and the plates are cast of large size. The process was first conceived and devised 1688 by Abraham Thevart, in the Faubourg S. Antoine at Paris. The first plate glass works in England were established 1773 at Ravenhead, near Prescot, Lancashire, as "The British Plate Glass Company". The ordinary sizes run up to 100 ft. superficial, while the largest ordinary size is 17 ft. by 9 ft. 6 in. The largest plate yet polished was exhibited at Paris in 1878 by the St. Gobain Plate Glass Company; it was 24 ft. by 14 ft. and was silvered as a mirror; in 1855 at Paris the largest plate exhibited by the company was 18 ft. by 11 ft. 9 in. and half an inch in thickness. The process of manufacture is given in URE, *Dict.*, 7th edit., 1875, ii, 661-8, s. v. Glass; also in TURGAN, *Les Grandes Usines de France*, 4to., Paris, 1861-73, *La Manufacture de Glaces de Saint Gobain. Notes on Building Construction*, 8vo., Lond., 1879, iii, 428. The ordinary thickness of British polished plate glass is $\frac{1}{4}$ inch, it can be selected not above 3-16th thick. Plate glass is selected into two divisions, glazing and silvering qualities, each being again subdivided in accordance with excellence or defects; for glazing purposes in the best situations; second—silvering quality, which is free from defects should be used.

The diminution of light intercepted by passing through various sorts of glass is given thus:—

British polished plate	13 per cent.
Rough cast plate	30 ,,
Rolled fluted plate, 4 flutes to the inch . . .	54 ,,
32 oz. sheet	22 ,,

Rough cast plate is made in a similar manner to plate, but with inferior metal; it is used for roofing, as in skylights; floors, and enclosures where transmission of light without transparency is only required. It can be obtained of considerable thickness up to $1\frac{1}{2}$ inches, and when ground on the rough face it diffuses light in an agreeable manner.

Patent rough plate, produced by Messrs. Hartley of Sunderland, has on one side a pattern from the face of the casting table, which in place of being smooth is indented with fine lines. The "plain" has only fine lines. No. 2 fluted has 12 flutes to the inch. No. 1 fluted has $3\frac{1}{2}$ flutes to the inch. Quarry No. 2 is 3 in. by 2 in. from point to point. Quarry No. 1, 6 in. by $4\frac{1}{2}$ in. from point to point. A small quarry is known as "Diamond rough plate glass". The "plain" and "fluted" vary in thickness from $\frac{1}{8}$ to $\frac{1}{2}$ in., the "quarry" from

$\frac{1}{8}$ to $\frac{1}{2}$ in. This glass is much used for ridge and furrow roofs, greenhouses, factories, workshops, and similar purposes.

Patent plate glass is a superior description of sheet or cylinder glass, introduced by Messrs. Chance of Birmingham about 1840. After being annealed it is polished in a manner equal to Plate glass, the processes of grinding and polishing being the special merit of this invention. Where lightness and thinness are required, this glass is very useful, and it is now produced of beautiful crystal quality; by the process of manufacture the size obtainable is limited to about 13 ft. superficial in a sheet, and if above 50 inches long or 36 inches wide the price increases considerably. There are four thicknesses—

No. 1.	1-16th of an inch . . .	13 oz. per ft. super.
,, 2.	1-12th ,, .	17 oz. ,,
,, 3.	1-10th ,, ...	21 oz. ,,
,, 4.	1-9th ,, . . .	24 oz. ,,

It is much used for glazing engravings, photographic purposes, and where lightness and brilliancy are required to be combined. A. C.

The qualities of the various sorts are noticed in the *Price books* and manufacturers' tariffs. The excise duty was removed 1845. The history of its manufacture is indicated s. v. Glass (p. 46, etc.). *Statistics of plate glass trade* from 1819 to 1848; BUILDER *Journal*, v, 432; CIVIL ENGINEER, ETC., *Journal*, ix, 197; xi, 316. *Plate glass and its manufacture* at South Shields, BUILDING NEWS *Journal*, 1867, xiv, 607-8. ENCYCLOPÆDIA BRITANNICA, 8th edit., p. 665. ROY. INST. OF BRIT. ARCHITECTS, *Paper*, 31 Dec. 1849, and *Notice Paper*, 14 Jan. 1850. FRENCH GLASS.

PLATE IRON. A flat and large piece of thin metal, ranging from No. 1 wire gauge to No. 23. Thicker metal is called SLAB. Table of the weight of a superficial foot of iron, copper, and brass plates, is given in OVERMAN, *Mechanics*, 1861; and in the usual books of Tables, etc. Iron plates have been used for roofing purposes, as about 1784 at S. Petersburg; HOWARD, *Lazarettos*, p. 230; the new Houses of Parliament; and are suggested for slates and tiles, in BUILDING NEWS *Journal*, 1869, xvii, 297. BOILER PLATE. MALLET'S BUCKLED PLATE. PORTER, *Treatise on Manufacturing malleable iron scraps into bars, boiler plates, etc.*, London, 1841. TEMPLETON, *Workshop Companion*, 11th edit., 1873. The breaking strain and contraction of area of puddled steel plates, as in iron plates, are greater in the direction in which they are rolled; whereas in cast steel they are less; KIRKALDY. "Boat plates" are said to be not so strong as decent millboard, and so rotten as hardly to hold together.

PLATE IRON BEAM OR PLATE GIRDER. A beam constructed of top and bottom horizontal plates of wrought iron, generally boiler plate, connected by angle irons riveted to a vertical plate in the middle of them. FAIRBAIRN, *On the application of iron*, 8vo, London, 1854, p. 73; 105; states that he gives the preference to the plate beam over the BOX BEAM on account of its simplicity of construction; and that although inferior in strength, it has valuable properties to recommend it. *Illustrations*, s. v. Girder, 1861, pt. 2. GIRDER (p. 38).

The formula is given in GWILT, *Encyc.*, 1867, p. 438, and in other modern *Guides* and *Handbooks*: and in BUILDING NEWS *Journal*, 1867, xiv, 205, 237, 304, 422, 472. *Longitudinal stress, etc.*, in CIVIL ENGINEER, ETC., *Journal*, xxiii, 264; 294. BUILDER *Journal*, xi, 1853, 646; 677; 728. DEMPSEY, *Tubular Bridges*, fol., 1850. Used at Covent Garden theatre, by E. M. BARRY, Royal Inst. of Brit. Architects, *Sessional Papers*, 1860; 96 ft. by 9 ft.; 17 tons, and BUILDER *Journal*, 1860, xviii, 102. Corrugated plate iron in the construction of a beam, was patented 1849 by — Porter of Southwark; experiments are noticed in CIVIL ENGINEER, ETC., *Journal*, 1849, xii, 58.

PLATE IRON GIRDER BRIDGE. DEMPSEY, *Iron applied*, 4to., Lond., 1850, gives Chalk Farm Lane bridge, 60 ft. flat, by R. Stephenson. Over Randolph Street, Camden Town, 21 ft. 6ins., by — Martin, CIVIL ENGINEER, ETC., *Journal*, 1850, xiii, 360-1. At Chalk Farm, in HOSKING, etc., *Bridges*, Supp. pl. 4. BUILDER *Journal*, 1855, xiii, 310, describes, at Bristol, nine girders 107 ft. long: one near London bridge, 1863, 186 ft. span, 300 tons.

PLATERESQUE STYLE, or EL PLATERESCA; see BERRUGUETE STYLE.

PLATE TRACERY. A term proposed by prof. Willis, for *tracery* which is cut, as it were, out of a flat plate of stone, without mouldings other than a chamfered edge. It is the transitional link between the lancet and tracery systems. EARLY ENGLISH. The principle of placing two or more openings under a comprising arch, needed only the piercing of the spaces between the openings in the window heads to convert them into actual tracery; the ultimate change was first adopted in France. Plate tracery appears to have been introduced at Lincoln cathedral by S. Hugh of Burgundy. It was more used and developed to a greater extent and on a larger scale in Burgundy than in England; but a complete series may be found in this country at Lincoln; the great wheel window in the north transept is the earliest and the finest window of its class in England, and an almost unique example of such tracery. The west window of the church of S. Nicholas at Blois is strikingly like it, and may have been its predecessor; GENTLEMAN'S MAGAZINE, 1860, 3rd ser., ix, 640. Although plate tracery is the rudest sort of tracery yet it is susceptible of great variety of design. VIOLLET LE DUC, *Dict.*, s. v. Fenêtre, p. 381, gives a window from Chartres cathedral showing a double lancet with a rose above it; see also s. v. Rose, p. 50; 64-6. SCOTT, *Gleanings from Westm. Abbey*, 8vo., London, 1859; 1863, p. 18, etc. STREET, *Brick, etc., Architecture*, 8vo., London, 1855, p. 264 (270, 274-5), notices in Italy, "where sunshine is brilliant and constant, the plain unbroken surfaces of wall, marked here and there with some delicate line of moulding or ornament, whose every outline—was marked unmistakably by the deep black line of shade cast upon it by the power of the sun.—The drawings show how generally the tracery, commonly called 'plate tracery', was used".

PLATFOND; see PLAFOND.

PLATFORM. A term used in respect of a plan or ground plot of a house, as 1577, s. v. R. KIRBY: and R. SCOT, *The perfite platforme of a Hoppe Garden*, 4to., London, 1578. "1592, Item to a paynter for drawing of a platforme of S. Marie's steple upon velam parchment for my lorde Archbysshop of Caunterburie, xviij*d*.," *Accounts* of S. Mary the Gt., at Cambridge, in ARCHÆOLOGICAL JOURNAL, xii, 254; and in CAMBRIDGE CAMDEN SOCIETY, *Transactions*, 255. NOTES AND QUERIES *Journal*, 1862, 3rd ser., ii, 426, notes another instance, temp. Sir C. Wren. PLATT.

PLATFORM. (Fr. *radier*). A level surface prepared for the erection upon it of one or more buildings. The "platform" at Persepolis, about 1500 ft. by 936 ft., is raised high above the level of the surrounding land; also that of the temple of the sun at Baalbec. Vienne cathedral rises from a platform or parvis elevated about 12 ft. above the street, the ascent being by a flight of steps; the French cathedrals are, with hardly any exception, so placed, Vienne being perhaps the highest. The cathedral and baptistery at Pisa are likewise placed on platforms rising three or four steps all round.

"Most of the public sacrifices of the ancients took place on a platform in front of the naos or ædes" of the temple, "where there was on some occasions a fixed altar protected by a covering"; DONALDSON, *Temple at Bassæ*, in STUART, *Antiq.*, fol., London, 1830, iv, 9-10, who gives a plan and section of the platform of the temple of Juno Lucina, and seats, etc., in front, at Agrigentum. 1. 6.

Any temporary elevation of a plane description raised above the surface of the ground, as for the font and table in a church.

In a synagogue there is a raised platform above the ground for the seats of the elders and reading of the law. It is about 12 ft. by 9 ft.; or 10 ft. by 8 ft. 6 in.; or 10 ft. by 15 ft. 9 in., including the seats below it for the wardens.

In plumbery, that which is now called a FLAT, with or without seams; NEVE, s. v. Lead. TERRACE. RAILWAY STATION. 1. 4. 6.

The name of a mode of construction, also called GRATE and grillage, formerly much used in the preparation of an artificial foundation in gravel or sands charged with water. It was formed of two or more layers of planks, or of timbers, spiked or trenailed together so as to form a floor over the whole surface. The doge's palace at Venice is said to be erected on a timber platform (a sort of floating one) on the wet sand. Such a platform being subject to decay, piling or concrete would now be used. FOUNDATION. BUILDING NEWS *Journal*, 1874, xxvii, 13. ARCHITECT *Journal*, 1850, ii, 92. DALY, *Revue Générale*, 4to., Paris, 1840, i, 141-3. A "platform" of concrete was laid preparatory to the erection of the new post office in St. Martin's-le-Grand, London, 1824, by Sir R. Smirke: others were made at the royal exchange; the foreign office, etc. Under a bye-law made by the Metropolitan board of works, Oct. 1879, "the site of every house or building shall be covered with a layer of good concrete at least 6 inches thick, and smoothed on the upper surface, unless the site thereof be gravel, sand, or natural virgin soil". PILE.

A row of beams on the top of a wall to support the timber work of a roof. 4. 6.

PLATINUM. A metallic substance, discovered shortly before 1825, so called from the Spanish, in allusion to its colour, and meaning "little silver". It is not affected by air or water; retains its polish at white heat; is very malleable and ductile; scarcely to be melted; and dissolved only by nitromuriatic acid, but when alloyed with other metals it is soluble. It is much used in making the best drawing and surveying instruments, in lieu of brass as formerly, especially for use in hot countries.

PLATT or PLATTE; see PLAN and MAP. PLATFORM. PLOT. PLENASHED TOWN.

PLATT (JOHN); error in some works for PLAW (JOHN).

PLATT (GEORGE), builder, of Rotherham, Yorkshire, designed and built S. Paul's church, Sheffield, 1720-40 (dome added 1769); HUNTER, *Sheffield*, fol., London, 1819, p. 158; and Wortley hall, for Edward Wortley Montague, esq., begun 1743; HUNTER, *South Yorkshire*, fol., London, 1831, ii, 323. Platt died 9 Nov. 1743, aged 43 years, and was buried in Rotherham Church yard. A son CHARLES, who died 2 June 1817, aged 47 years, was buried in the same church. The charity school house and dwelling, designed 1775-79; the almshouse altered to a prison; and the market house, all at Rotherham, are also by this family.

PLATTING. The final covering of a clamp of bricks; see BRICK (Manufacture of; p. 139)

PLATZER (JOSEPH), born 1752 at Prague, designed the kammer and hoftheater at Vienna. He died in 1810. 26.

PLAW (JOHN), born about 1745, was 1763 "architect and master builder in Westminster". In 1775 he designed the circular house on the great island in the lake of Winandermere, Westmoreland; a hermitage in the Green park lodge, London; Selsdon house near Croydon, for Thomas Lane, esq.; 1781 a villa at South Lambeth; façade addition to Wootton court, Kent, for rev. E. T. Brydges; 1786 designs for Glenfiodich, and two cottages, for the duke of Gordon; and for H. Mackenzie, esq., M.P., in Scotland; all these are comprised in *Rural Architecture, etc.*, 62 pl., 4to., London, 1785; 1796; 1800; 1802. Many other executed designs in Hampshire and Yorkshire are published in his *Ferme Ornée* or *Rural Improvements*, 38 pl., 4to., South., 1795. He occasionally exhibited from 1775 at the Royal Academy, as 1787, Haresfoot, Herts., then building. He designed 1788-91 Paddington Church, London; STIEGLITZ, *Plans, etc.*, fol., Paris, 1801, pl. 45-6. About 1795 he removed to Southampton, where he 1806 built the large barracks; plan in Military Enquiry Commission, *2nd Report*, 326; and *4th Report*, 424; and published *Sketches for Country Houses, Villas, etc.*, 42 pl., 4to., South., 1800. He was a member 1766 and last president of the incorporated society of artists of Great Britain, and died May 1820 on the banks of the river Saint Lawrence, in North America; ACKERMANN, *Repository of Arts, etc.*, 1822, new ser., xiv, 250-1. J. B. Papworth was a pupil.

PLAYER CHAMBER or PLAER CHAMBRE. A room in the priory at Finchale, noticed as appropriated to dramatic representations, and the room in which the monks assembled to hear the minstrels and glee men. SURTEES SOCIETY, *Finchale priory*, 8vo., Newc., 1837, p. 441.

PLAYEZ (A..... F.....), designed and built 1756-60 the hôpital général de la Charité, at Douai: it is a good plan and description of an hospice. DUBOIS-DRUELLE, *Douai Pittoresque, etc.*, 4to., Douai, 1845, p. 77, with plan; added to 1787-94 by le sieur Voisin.

PLAYFAIR (WILLIAM HENRY), born July 1789 in London, was son of James Playfair of Russell Square, who published *A method of constructing Vapour Baths*, 8vo., London, 1783; was living in 1792 and stated to be "an eminent architect". From 1794 William resided at Edinburgh with his uncle prof. Playfair, and studied under W. Stark of Glasgow. The plans and elevation of a design 1787 for Duninald house, are in sir John Soane's museum. Among his works at Edinburgh are 1815, laying out part of the lower new town; and 1820, another part consisting of Royal and Regent Terraces. 1819, gateway and lodge to Heriot's hospital. 1817-24, the university completed, etc., retaining the exterior by R. and J. Adam (in competition of 100 gs., the second or 80 gs. awarded to W. Burn). 1814-8, Observatory (Greek Doric). 1819, Advocates' library, 140 ft. by 42 ft. by 28 ft. 1820, prof. Playfair's monument. 1822-36, Royal institution (Greek Doric); BUILDING CHRONICLE, 1855, i, 144; 158. 1822-26, National monument on Calton hill, from a design by C. R. Cockerell, R.A. 1826-28, S. Stephen's church (Doric, hexagon), one of the best churches for hearing; holds nearly 3000 persons. 1830, college of surgeons and museum (Greek Ionic). 1830-1, Dugald Stewart monument. 1842-48, Donaldson's hospital (Tudor; obtained in limited competition with Gillespie Graham and David Hamilton of Glasgow), 269 ft. by 275 ft.; considered to be his best work. 1846-50, Free church college (Tudor); Minto chapel (Tudor); 1850-54, National Gallery (Greek), BUILDER *Journal*, 1857, xv, 322.

His country houses are numerous, the following are not in dated order. Kinnaird house, co. Forfar; FORSYTH, *Beauties of Scotland*, 8vo., Edinb., 1805-8, v, 572. Before 1818, Buchanan place, Stirlingshire, considerably enlarged for duke of Montrose; Bothwell castle; and Melville castle; JONES, *Views in Scotland*. Before 1846, Bonally, for lord Cockburn, a square keep at the foot of the Pentland hills, near Edinburgh; Dumphail house, Morayshire (Italian); Belmont, for lord Mackenzie (Italian) (afterwards held by J. Hope, D.K.S); Drumbanagh house, Armagh (Italian); with Bamore, Preston grange, Craigcrook, and Islay house, all in the Scottish baronial style; Lurgan house; and Fleurs, for duke of Roxburgh (Tudor).

He died 19 March 1857, aged 67 years. Memoir in BUILDING NEWS *Journal*, 1857, iii, 359-60, by J. M. Hay; and by J. M. GRAHAM, in ARCHITECTURAL INST. OF SCOTLAND, *Transactions*, 1859-61, 8vo., Edinb., 1862, v, pt. 4, 13-29: and BUILDER *Journal*, 1860, xviii, 140. 14.

PLAYGROUND. The usual covering is gravel. Asphalte and tarred gravel have also been used. York stone paving is found to make the playground inconveniently hot and oppressive during the summer months, and the refraction of the sun's rays appears to be troublesome to children having weak eyes, but on the whole it has great advantages over other surfaces suggested. Cement may probably supersede these materials.

PLAYHOUSE; see PLAYER CHAMBER; and THEATRE.

PLAYTED PILLAR; see RUSTIC.

PLAZA (SEBASTIAN DE LA), maestro de las obras to the cardinal archbishop of Toledo, visited 1630 and approved the church of Yunquera near Toledo, begun 1625 by J. de la Sierra and A. de Madrid, and continued by them to the cornice. The façade of the archiepiscopal palace at Toledo, designed 1617 by Gomez de Mora (but which is probably by J. B. Monegro), was carried out after 1621 by S. de la Plaza. The design of the archiepiscopal (?) palace at Alcala de Henares, attributed to A. Berregu-

ete, or 1617 to J. B. Monegro, his pupil, was continued 1621 by S. de la Plaza, and finished by J. Gomez de Mora. 66.

PLEASANCE CHAMBER. A room of state in a royal palace. When the ambassador from Charles of Burgundy was entertained by king Edward IV, "iij chambres of Pleasaunce" were decorated for him, as described in TURNER AND PARKER, *Dom. Arch.*, 8vo., London, 1859, iii, 106-7.

PLEASURE GROUND. This is in contradistinction to the kitchen ground attached to an ordinary country house, and to the park of a larger residence. Detailed suggestions are given in LOUDON, *Country Residences*, 4to., Lond., 1806, ii, 434. *Scotch Gardener's Tour through France and Flanders* (before 1822), p. 80, gives some pretty plans; with other works named s. v. LANDSCAPE GARDENING.

PLEBANIA. The Latin term used for a mother church with depending chapels; KENNETT, *Antiq. of Ambrosden*, in Gloss., 4to., London, 1818, 2nd edit. 19.

PLEBANUS. In the church at Groppoli, 3 miles from Pistoja, is a *pergamo* with an inscription, "Hoc opus fecit fieri hoc opus s. v. Pleban. anno Domini MIIICLXXXIII", as given in CICOGNARA, *Scultura*, fol., Ven., 1813-18, i, 324; and he is apparently again referred to in another, p. 360, respecting the *lavoro* 1301 in S. Giovanni fuor civitas, at Pistoia.

PLEBER of Utrecht; see PRENTICE.

PLENASHED TOWNS, "as Dumfries, Annand, Loughmaben, and such like", occurs in "A Platt of the opposite borders of Scotland", etc., 1592, in British Museum, Bibl. Reg., 18 D. iii, and given in ARCHÆOLOGIA, 1829, xxii, 161; the term is not explained.

PLENUM SYSTEM OF VENTILATION. Fresh air forced into an apartment or interior of a building, the vitiated air being allowed to escape by openings. It is opposed to the VACUUM SYSTEM, where the vitiated air is drawn out.

PLERA. The modern GRAVINA, in Southern Italy.

PLETHRA. A measure of length, see AROURA.

PLEXIFORM. Net like; the wicker work like sculpture of Norman architecture, as carved in the spandrils of the nave arches at Bayeux cathedral. BRITTON, *Arch. Antiq. of Normandy.*

PLIERS or PLYERS. An instrument something like nippers, but having flat ends for firmly holding wires, and in twisting or bending them. A sort of pincers or tongs. The old form is figured in MOXON, *Mechanick Exercises*, Smithing, 1677, p. 5, pl. 1. 4.

PLINIUS CÆCILIUS SECUNDUS (CAIUS), born A.D. 61 or 62, at Comum in Isubria. While pro-consul 103 in Bithynia, he had the care of all the buildings connected with public convenience; he built the baths at Nicomedia, the capital; repaired many public and private edifices in various parts of Asia Minor: built a fine theatre at Nicæa; and cut a canal from the lake there to the sea; at Como, a library which he endowed; and at Milan and other cities he erected buildings. The emperor Trajan gave him the superintendence of the aqueducts, and other offices succeeding to Frontinus (died 106). He is supposed to have died about 116. The best edition of his *Epistles* (which were discovered, *cir.* 14..., in MS. at Paris by Giocondo), is that by Cortius and Longolius, 4to., Amst., 1734; HEARNE, with life by MASSON, 8vo., Oxford, 1703; by GIERIG, 2 vols., 8vo., Leipzig, 1806. English Translations by JOHN ORRERY, earl of Cork, 4to., Lond., 1751, 2 vols. WARBURTON, *Misc. Translations*, 12mo., 1724. Transl. by several hands with life by Henley, 2 vols., 8vo., 1724. MELMOTH, 8vo., 1747; last edit. 1805. 3.

Pliny's description of his *villas* in books 2, ep. 17, and 5, ep. 6, have formed the theme for many attempts at delineations; as by SCAMOZZI, *L'idea della Arch. Univ.*, fol., Ven., 1615, pt. 1, b. 3, chap. xii; FELIBIEN, *Les Plans et les Descriptions de Deux Maisons de Campagne de Pline le Consul*, 8vo., Paris, 1699; Amst., 1706; London, 1707; MARQUEZ, *Ville de Plinio*, 8vo., Rome, 1796; SCHINKEL, *Projets*, fol., Berlin, 1829-35; DALY, *Revue Générale*, 1849, viii, 126. In 1820 the gold medal of the Royal Academy of Arts in London was awarded to Sydney Smirke, for a design for this subject.

PLINTH. The lower projecting face under the circular base of a column, or the lower mouldings of a pedestal (ORLE), or of a skirting. Its proportions are given in most publications of the Orders. It is a term also given to a rectangular block upon which an object is placed, as a statue: and to the block under a column, as at Segeste. PEDESTAL. PODIUM. An example of a lengthened plinth, or discontinued podium, forming seats, at a building at Florence, is given in MAUCH, *Darstellung*, 4to., 3rd edit., Potsdam, 1845, pl. 97. "Gradated plinths are a peculiar characteristic of most—I believe all—of the ancient temples"; SMIRKE, *Lectures*, in BUILDER *Journal*, 1862, xx, 143.

PLINTH COURSE. The projecting face of a building next the surface of the ground; it is called "base course" in the North of England: and in old works "ground table". In the choir at Canterbury cathedral, the base of the piers has a plinth under which, separating it from the ground table, is a wide groove which "once received a stout band of iron encircling the entire plinth, and the ends of which may still be seen projecting from the masonry of the screen wall"; WILLIS, *Cant. Cath.*, 8vo., London, 1845, p. 98. BASE OF A WALL. 1. 11. 14. 25.

PLINTHIUM. A species of the ancient dial; see LACUNAR. It is thought to mean the block, in which is a hollow or *lacus* having the lines traced inside; as the example at Pompeii.

PLINTHOS. The term used by VITRUVIUS, iv, 3, etc., for the abacus of a capital, perhaps the primitive capital, as at AMADA. It is also used for the corona, in the inscription relating to the Erectheum; INWOOD, *Erechtheion*, p. 94.

PLITA TOSSENSKAJA. A stone which does not imbibe water, and is therefore used, with granite, as a plinth course, at Saint Petersburg. RUSCA, *Recueil, etc.*, fol., S. Pet., 1810, pref. 5; 15.

PLO (DON ANTONIO), finished 1770 the crypt of the church of S. Francisco el grande, at Madrid, which had been designed and commenced 1761-68 by fra Francisco (Josef de las Cabezas): the edifice was further completed 1784 by Sabatini.

PLOCK, PLOSKO, or PLOTSK. The capital of the government of the same name in Russian Poland, situated on the river Vistula; it is one of the oldest towns of Poland, and was formerly the residence of the dukes of Masovia. It has 25 squares. The chief buildings are an ancient cathedral, dedicated to S. Sigismondo, having tombs of three kings or dukes of Poland, and that of bishop Lubienski; ten other Roman Catholic churches; and a bishop's palace in which are the courts of justice. 28. 50. 96.

PLOMMER and PLUMMERAGE; see PLUMBER.

PLOT. A drawing. A "draught of any parcel of ground in its proper dimensions". "1624, according to a plott made and drawne and shewn to the said Sir Paul d'Ewes before the sealing hereof"; *Harl. MS.*, 98, art. 20. 1629, contract for a tomb in Brocklesby church, Lincolnshire; "plot drawne by Wm. Wright, graver in stone". NOTES AND QUERIES *Journal*, 3 ser., x, 22. GROUND PLOT. DRAWING. PLATT. 4.

PLOT. A subdivision of a large piece of land, either for a garden or for building upon; such as are provided by the Land Societies. Tables are published showing the proportion of the area of a plot to an acre. *Gardening for Plots*, in *Lloyd's Newspaper*, No. 825, Sept. 12, 1858.

PLOTI (BARTOLINO DA NOVARA) called de' Ploti, living in 1375; designed 1393-1406 the castello di corte, the palace and fortress, for Francesco Gonzaga IV, at Mantua: (STREET, *Brick, etc., Arch.*, p. 185); 1385-87 the moated castle at Ferrara; GALLY KNIGHT, *Eccles. Archit.*, fol., London, 1842, ii, 35, showing the forked battlements: and May 1400 was consulted on the works at Milan cathedral; GIULINI, *Memorie*, 4to., Milan, 1760, xi, 457 FRANCHETTI, *Milano*, 1821, p. 141. He was buried in the church of S. Francesco. 28.

DOMENICO MARIA DA NOVARA, born 1464 at Ferrara, appears to have been of the same family; BARUFFALDI, *Contin. delle Mem. Istoriche*, 4to., Fer., 1811, p. 69; 129.

PLOTTING. A term used by surveyors in laying down to

scale, a plan of a road, estate, etc., from measurements taken on the spot. BUILDING NEWS *Journal*, 1869, xvii, 64.

PLOTTING SCALE. An instrument or scale for plotting field notes. One of an improved form, by E. C. Blake, is given in BUILDER *Journal*, 1847, v, 66. Dean's patent plotting and computing scale, is shown in BUILDING NEWS *Journal*, 1869, xvi, 155.

PLOUGH or PLOW PLANE. It is a narrow rebate plane made according to the widths of the grooves. The iron towards the bottom is not enclosed in the stock, and projecting, works out the wood as intended: MOXON, *Mech. Exercises*, 4to., London, 1693, p. 68.

PLOUGHED AND TONGUED BOARD. Same as MATCH OR MATCHED BOARD, except that both the boards are grooved, and one is generally beaded, and wood tongues or strips of iron are inserted. If the former, they should be cut feathering or diagonally to the grain to prevent the swelling of the tongue.

PLOWMAN (THOMAS), eldest son of — Plowman of Oxford, obtained 1822 and 1824 medals from the Society of Arts for original designs. He submitted 1823 a Gothic design in competition for works at King's College, Cambridge; and obtaining the premium for improving S. Mary's church at Oxford, he was employed to rearrange it with new stalls, all just completed at his death 19 Feb. 1828, in the 22nd year of his age. He also designed 1826 Church-hill church, near Chipping Norton, reproducing, it is said, the tower of Magdalen college two-thirds in size.

PLUG. A small piece of wood, driven, at heights of from 18 ins. to 2 ft., as a wedge into a joint in a brick or stone wall, to which jamb lining, battening, and similar work, is to be secured. The battens are now often secured by holdfasts acting as plugs also. A wood brick is sometimes built in with the wall. A piece of hoop iron bond doubled back, is now often built in the joint and holds a nail firmly.

The pin or plug in the beds of drums of columns. DOUBLE PLUG in lead: Sinkings on the opposite faces of the joint of two stones, run in with lead, thus forming a plug or key connecting the stones and preventing them from shifting horizontally. DOWEL. JOGGLE.

The plug (Fr. *tampon*) of a cesspool (Fr. *puisard*), is the filling in to the opening or man-hole for removal in cleansing it.

The great wooden peg to stop the bottom of a cistern, a water pipe, etc. 4.

PLUG as a safety valve. A small fusible plug affixed to any hermetically sealed boiler, to protect it from bursting. It is made of a metal which melts at a heat a little in excess of boiling water; when therefore the boiler is sealed up by frost, the water becoming above 212°, the plug melts, an opening is made in the boiler, steam escapes, and an explosion is prevented. A similar plug is used to indicate when water in a steam boiler becomes below the safety level.

PLUG AND FEATHER. Two wedges and a key, used in splitting large blocks of stone. GRANITE (p. 72).

PLUGGING. The filling with lead, or with cement, the tail ends of iron castings let into holes in stonework; as the feet of iron railings, and such like. BUILDER *Journal*, 1853, xi, 380. A small quantity of salt placed in the hole before running in the hot metal prevents the lead flying, however damp the stone may be. GALVANIC ACTION. STOPPING.

PLUMB (Fr. *aplomb*). A term used in the sense of being upright, when tested by the plumb-rule. 5. 40.

PLUMBAGO. A carburet of iron, called "wadd", used in making black lead pencils for drawing. The best is considered to be obtained from the mines of Borrodale, which have been worked since 1644; and when they failed to produce it free from grit, W. Brockedon happily discovered about 1845 a process of using up the crude black lead, at that time thrown away as useless, by purifying and condensing it into a perfect form. PENCIL. GRAPHITE. BLACK LEAD. The foreign plumbago is mixed with antimony, sulphur, and other materials unfit for drawing pencils, harsh, and almost unable to be obliterated by indiarubber. Inferior plumbago is used advantageously in the manufacture of crucibles as it stands a high temperature; and in facing the sand-moulds for iron castings. Exhibition of Industry, 1851, *Illustrated Catalogue*, i, 128.

The cast-iron raised from the wrecks of the *Edgar* and the *Royal George*, was generally soft, and in many instances resembled plumbago. It has been noticed that in the early steam engines, in which the packing segments were of gun metal, and the body of the piston was of cast-iron, wherever the two metals were in contact the iron was turned to plumbago; especially where high pressure steam was used. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, 1842, ii, 153; iii, 86. Cast-iron water pipes of certain inferior metal, laid in clay soils, are found to change in parts into this substance.

PLUMBARIUS (late Lat.); see LAVATORY.

PLUMBER. The artificer who formerly worked in lead only, but later also in copper and zinc. *Plumber's work*, also called *plumbery*, and plummerage, formerly comprised the reduction of lead from the pig state into sheets of various thicknesses (LEAD), but now the artificer usually obtains his materials from the manufacturer, and applies them to roofs and flats (FLAT; GUTTER); to the water supply; the fitting up of metal baths; lead glazing to windows (LEADWORK); water closet apparatus, etc.

The plumber's trade and its history is given in the EDINBURGH NEWS, Oct. 1852; and BUILDER *Journal*, x, 811. The plumber's company in London was incorporated 1611, 9th James I. Contracts dated 1367 and 1370 with a plumber, at York, are given in BROWN, *York Cath.*, 4to., London, 1838-47, p. 164: and SURTEES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859, p. 179 and 182. SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aber., 1844-48, i, 241. The title of "serjeant plumber" in the tower of London, Westminster, Eltham and Shene, occurs in the HARL. MS., 433, p. 53; another, 1555, in Additional MS., 5,755, fol. 282; and office of serjeant plumber of the works, fee 1s. per day, 40s. livery, and dwelling house rent free; STATE PAPERS, *Calendar, Domestic Series*, 1661, p. 586. The meaning of this term "serjeant", as applied to a few artisans in the royal service, was noticed in NOTES AND QUERIES *Journal*, Ser. 1, vi, 292; a document relating to a "serjeant painter" is inserted p. 238.

HELLYER, *Plumbing and Sanitary Houses, a Practical Treatise on the Principles of Internal Plumbing Work*, 8vo., 1876. ELDRIDGE, *Plumber and Pump Fitter's Guide*, 1874. PRACTICAL PAPERS ON PLUMBING WORK, in the IRONMONGER *Journal* for June, 1878: and in BUILDING NEWS *Journal*, 1872 and 1873. BUCHAN, *Plumbing, a text book, etc.*, 12mo., Lond., 1876; 1880. THE PLUMBER AND SANITARY ENGINEER *Journal*, New York, 1879. DALY, *Histoire du plomb, etc.*, in REVUE GÉNÉRALE, xxiv, 60, 99, 101, 253. *Plumbers abroad and at home*, in BUILDER *Journal*, 1874, xxxii, 632.

Ornamental work in lead, on the summits of roofs and turrets, is illustrated in DE LA QUÉRIÈRE, *Essai sur les Girouettes, Epis, etc., des anciens combles*, 8vo., Paris, 1846; partly translated in *Detached Essays*, s. v. Ridge (ornamental); and s. v. Hipknob, with plates. BURGES, *Lead Ornamental work*, BUILDER *Journal*, 1856, xiv, 410; reprinted as revised, in ECCLESIOLOGIST *Journal*, 1856, xiv, 385. GOODMAN, *On Leadwork*, BUILDER *Journal*, 1862, xx, 319. The *spire* to Sainte Chapelle at Paris, *idem*, 1855, xiii, 505: the central flèche of Notre Dame at Paris; DALY, *Revue Générale*, 1851, ix, 12, 17: much work of this sort is now being done in France. Ornaments cut, stamped, or cast in lead, painted and gilt, were found by S. Smirke, R.A., attached to the ceiling attributed to Holbein at the chapel royal, S. James's palace. The pinnacles in the façade to S. Mark's at Venice are stated by BURGES to be of lead. *Statues* of lead were rare in ancient times, but COCKERELL, *Temple, etc.*, fol., London, 1850, remarks that parts of the figures in the pediments to the temple at Ægina were of lead. Notices of such works occur in ARCHITECT *Journal*, 1850, ii, 240; ATHENÆUM *Journal*, May

1850; J. T. Smith, *Antiq. Rambles*, i, 17. A list of twenty-two lead *fonts* in England, nearly all of the Norman period, is given by Way, in Archæological *Journal*, 1849, vi, 162. A *cistern* dated 15... is engraved in Builder *Journal*, 1862, xx, 604. The fine lead *coffins* in the Temple church, London, are engraved in Richardson, *Mont. Effigies*, 4to., London, 1843. A *fountain* at Versailles, is given in Rouyer et Darcel, *L'Art Arch. en France*, 4to., Paris, 1863-66, ii, 45. Lead has also been used in the joints of tracery, moldings, and *beds* of columns. *Coins* of lead are treated in Ficorini, *De Plumbeis antiquorum numismatibus dissertatio*, 40 pl., 4to., Rome, 1750; Gaetani, *Piombi Antichi mercantili*, app., 4to. (1775 ?).

PLUMBER'S TOOLS. These consist of scales and weights; hacking, chipping, putty, notched putty, chisel, pocket, drawing, closing, stopping, cutting, palette, and stone, *knives;* a *hammer*, a cistern, and a glazier's, hammer; a *mall; bossing mallets;* irons; gas pipe *tongs;* gas *pliers* with two and three holes; a *dresser and flatting tool* of hornbeam and boxwood about 18 ins. long; a half round *rasp;* box turn *pins; shave hooks* of various forms; *chisels and gouges; chase wedges; turn pins; planes* (Fr. *debordoir*); chalk line, centre bits, a three or four fold 2-foot rule, T square, laths and rules; stocks, dies, and taps for iron and brass pipes; single and double sucker hooks; blow pipe; and glazier's diamond. In *soldering*, a cast iron fire pot; a grozing iron; wrought iron ladles of various sizes; a straight, and a bent, copper bit; resin powder, and pieces of cloth. Glazier. A force pump, with and without lever handles for clearing small drains; and a service cleaning pump for larger ones. Warner and Tylor, *Catalogue*, p. 111; and Tylor and Sons, *Catalogue*, 12mo., London, 1872, p. 211-18, gives woodcuts of most of these tools. The plumber's fire *pot* has been the cause of the destruction of many edifices, public and private. A "plumber's fire safeguard" proposed by F. C. Penrose, is illustrated in the Builder *Journal*, 1873, xxxi, 983.

PLUMBIC ZINC. A patent material manufactured (before 1854) by Morewood and Rogers, and described as a perfect combination of lead and zinc; and not requiring to be more than $\frac{1}{4}$ or $\frac{1}{5}$ as thick as sheet lead: it was stated to be consequently cheaper than lead and not much more than zinc. No. 11 gauge weighed about 18 oz. per foot sup.; No. 12 about 20 oz.; No. 13 about 23 oz.; and No. 14 about 26 oz. Advertisements, Builder *Journal*, 4 February 1854. Wetterstedt's Patent Marine Metal.

PLUMB RULE. A thin flat piece of wood about 5 ft. long with straight edges, down the centre of which a line is indented; a hole of about the size and shape of an egg is cut near the bottom; and on the top are three nicks, one exactly in the middle, with one on each side of it a little way apart. A lump of lead, or plummet, or bob, having a cord or plumb line, passed through it, is then suspended from the nicks, the lead ball or plummet reaching into the hole. The rule is then 'tried' with one edge against the wall, and if perfectly upright, the plummet or plumb bob and cord will coincide with the hole and indented line. Builder *Journal*, 1871, xxix, 32. The level is for trying horizontal work. 1. 14.

PLUME. A bunch of feathers, used generally in decoration; such as the three called the Prince of Wales's feathers.

PLUMMET. The lead weight or bob fixed at the end of a string or plumb line.

PLUM TREE; see Prunus.

PLUTEUS. A dwarf wall, parapet or palisade, as in the Roman baths; or as used to close the intervals between columns; Intestinum opus; as in the flanks of the temple of Fortuna Virilis; and in the front of the temple of Saturn, described in Labacco, *Archit.*, fol., Rome, 1557. 2. 6. 25.

It is also a sort of podium intervening between any two orders of columns placed one above another, as in a basilica or *scena* of a theatre. It has been introduced between every two orders of columns in the exterior of all the Roman theatres and amphitheatres.

PLUYETTE (.....) was elected 1758 a member of the academy of architecture at Paris, and died 1769.

PLYERS; see Pliers.

PLYMOUTH MARBLE. A limestone obtained from various quarries near Plymouth in Devonshire. The Oreston quarries originally supplied the material for the breakwater there, in connection with limestone, which latter the Pholas so perforated that it had to be replaced with granite; Hunt, *Descr. Guide* to Mus. of Prac. Geology, 3rd edit., 24; and to Dover pier. It has a bluish white ground varied with veins of pale red with some of brown and yellow; and also a blackish ground intersected by white veins, and marked by numerous fossils, especially the favosites and other corals. It is capable of receiving a good polish. Hooe Lake quarry, Kingskerwell near Torquay, and Pomphlet quarry also supply this marble, which is used in buildings generally, the paving of Plymouth and Devonport, etc., as well as for interior pavements. 2. 14. 71.

PNEUMATICS. That part of physics in which are contemplated the mechanical properties of atmospheric air, etc. For the pressure and resistance of the air against bodies, see Aerodynamics. The principle of pneumatics has of late been employed in pile driving; for raising weights (lift); for ringing a bell, or making a signal (1874); for pump work (Gregory, *Mechanics*, p. 285), etc. Pyro-pneumatic stove. Hydrostatics. Lardner, *Handbook of Natural Philosophy*. 1851. 14.

Dr. Potts' pneumatic system of pile driving (cylinder); Institution of Civil Engineers, *Proceedings*, x, 319-55. Builder *Journal*, 1850, viii, 165; and 1873, xxxi, 389, from American Society of Engineers; Building News *Journal*, 1873, xxiv; Civil Engineer, etc., *Journal*, 1844, vii, 238, 388; 1847, x, 388; At the Shannon iron bridge; *idem*, 1850, xiii, 392. Hann and Hosking, *Bridges*, 8vo., Supp., London, 1853, p. 100.

Hughes's pneumatic method of constructing foundations; see Cylinder.

PNYX. The place for public meetings, at Athens, in the more ancient period of the State; the *bema* is distinctly visible; Stuart and Revett, *Antiq. of Athens*, fol., London, 1794, iii; and 1830, iv. Smith, *Dict. Geog.*, 282. Dodwell, *Cyclopæan, etc., remains*, fol., London, 1833. Breton, *Athènes*, 8vo., Paris, 1868, p. 317. Reveley, *MS. Dict.*, at R. I. British Architects. Woods, *Letters, etc.*

PO' (Giacomo del), born 1654, died 1726, of Naples, chiefly a painter, whose works are described in Dominici, *Vite*, 8vo., Nap., 1846, iv, 280-310. 36.

POCCETTI (Bernardino) of Florence, was master of C. Lotti. He made a drawing of the façade of Sta. Maria del Fiore at Florence as it appeared 1586, and is given in Molini, *La Met. Fiorentina*, 4to., Fir., 1820, p. 39, pl. 14.

POCCIANTI (Pasquale), cavaliere, practised also as engineer at Florence, where 1837-40 he restored the loggia di Lanzi by A. Orcagna; completed (after the works by G. Paoletti, and G. Caccialli) about 1840 the quadrant wings to the palazzo Pitti, and a staircase; 1840-41 the rotunda to the Medicean library for the Elce collection; designed many works at Poggia a Cajano for the duke of Tuscany; enlarged the *seminario* at Fiesole; with many other edifices in Tuscany. He was a hon. and corr. member of the royal institute of British architects; and died suddenly in 1859 at an advanced age. 68.

POCKET. A term applied to a space left within brick or stone work, affording opportunity for the accumulation of rubbish. Thus a dead flue often becomes a pocket, and by the fall of soot and sparks often endangers the edifice. A measure of hops, 6 ft. high, 2 ft. diam., and weighing about $1\frac{1}{2}$ to 2 cwt., is also called a pocket; a bag weighs nearly $2\frac{1}{2}$ cwt. Oast house. Budget.

POCOCK (William Fuller), born 1779 in the city of London, the son of a builder, was apprenticed to his father and then entered the office of C. Beazley. He designed 1820-22 the hall of the Leathersellers' company, S. Helen's place; 1827 the

priory at Hornsey; 1828 restored Brewers' hall, Addle street; designed the head quarters of the London militia, Bunhill row; 1840 Wesleyan Centenary hall, Bishopsgate street within; 1842 almshouses of the Carpenters' company at Twickenham; Christ Church, Virginia water; Grammar schools at Aldenham, Hertfordshire; monumental column at Hafod Climping parsonage, in memory of John, duke of Bedford: and very many minor works in almost all parts of the habitable globe. He was an early member of the Institute of British Architects, for which society he wrote *Observations on bond of Brickwork*, 1839; and published *Arch. designs for Rustic Cottages*, etc., 4to., London, 1807; 1819; 1823; *Modern Finishings for Rooms*, 4to., Lond., 1811; 1823: *Designs for Churches and Chapels, etc.*, 4to., Lond., 1819; and died 29 Oct. 1849, aged 69 years. His son William Willmer Pocock succeeded to his practice. *MS.* memoir in the library of the Institute of British Architects.

PODIUM. The Greek name for a low wall as a sort of continuous pedestal serving for a parapet; for a sort of terrace; or one on which columns were set up. It often had a plinth, dado, and capping. In SERLIO, *Archit.*, fol., Venice, 1663, p. 79, the term appears to be applied to a balcony supported by cantilevers. The podium was an essential feature in the temples of Pompeii as distinguished from those of Greece. The access to the temple was therefore by many steps, always of an odd number, according to VITRUVIUS. *Pompeii*, in Library of Entertaining Knowledge, 8vo., London, 1831, i, 99, 102. The Roman monopteral temples having no cella were usually placed on such a substructure, as the example in the ruins at Puteoli; the peripteral, with cella, have three steps. The temples at Pola have also the podium. VITRUVIUS, iii, 3, treats the podium as an important if not essential feature in architectural composition; SMIRKE, *Lectures*, in BUILDER *Journal*, 1858, xvi, 101; and xx, 143. Hence it is sometimes called a BASEMENT. ABACUS over the podium or species of dado. LYSIS.

In the ancient amphitheatre, VITRUVIUS, v, 7, the podium was the wall continued along the sides of the ARENA or pit. At Arles, it was found 1830 to be very perfect (ESTRANGIN, *Etudes*, 8vo., Aix, 1838, p. 23-4). At Pompeii, as at other places, the wall supporting the podium was pierced for doorways leading to the cellars or dens for the wild beasts. The LORICA or parapet above it afforded protection to the audience from the wild animals. CIRCUS. HYPOSCENIUM.

The podium was also adopted in the scenes of a theatre, where it was sometimes broken around the columns forming pedestals, hence the recessed part was the podium, and the projecting part the STYLOBATUM.

POECILE or POIKILE. The name of the principal stoa or portico at Athens, so called from its having a large number of paintings by Polygnotus, Mycon, etc.; it also had statues; and shields and other spoils taken by the citizens from their enemies. It was first called the pisianactic portico. Only very incomplete vestiges remain of other buildings of this sort either in Greece or Asia Minor. The stoa at Elis, called poecile, was also called echo. 78.

POELE (JEAN VAN DE), designed 1478 the hôtel (Pointed) of the Hanseatic merchants at Bruxelles; it existed until the end of XVIII cent.; SCHAYES, *Hist.*, 12mo., Brux., 1851, iv, 55. FACTORY.

POEPELMANN (MATHAEUS DANIEL), also engraver to Augustus II, king of Poland; was of Dresden, where he designed 1711 the *zwinger* as a fore-court to a future palace; the façades are given, with plans, in *Abriss des Chürfurst. Gartens, etc.*, or *Kurzer Entwurf*; or *Descr. du Cabinet roial*, 4to., Dresden, 1755: repaired 1723-32 the old stone bridge, adding the footways, balustrades and a raised roadway, much damaged in the wars of Napoleon; and with Knoefler, he 1732 gave the Japanese palace its present appearance. He died 1736 aged 74 years.

One of the same name died 1808 aged 80 years. POPPELMANN. 68.

POGGIUOLO. An Italian equivalent for a cantilevered balcony, it having a balustrade, as in the front of a house. MAENIANUM.

POICTEVIN, and POIDEVIN (.....); see POITEVIN.

POINT; see ACCIDENTAL VANISHING POINT; VANISHING POINT, and POINT OF SIGHT, in perspective. 25.

POINTED ARCH. Various methods of drawing pointed arches have been devised in accordance with the height of the versed sine. Some divide the chord line, or base of the arch, into certain proportions. The Italians preserve this fact by calling the arch "di terzo, quarto, quinto, sisto, etc., acuto", according to the number of such divisions, as in VIOLA ZANINI, *De Archit.*, 4to., Padua, 1629, p. 237; 240. SELVATICO, *Archit. in Venezia*, 8vo., Ven., 1847, p. 126. Other methods are shown in the books of the last century; NICHOLSON, in CIVIL ENGINEER, ETC., *Journal*, 1844, vii, 297. LAKER, *idem*, 1850, xiii, 365; and in BUILDER *Journal*, 1848, vi, 40, 123-4.

LANCET ARCH. Ogee, contrasted, or arch of double curvature, used *cir.* 1400-1500; see OGEE ARCH; VIOLLET LE DUC, *Dict.*; GWILT, *Encyc.*, edit. 1876, p. 571-74 and p. 1288. ELLIPTIC POINTED ARCH. FALSE POINTED or horizontal arch, FREEMAN, *History of Architecture*, 8vo., 1849, p. 36-9, 40, 47, 53-4, 87. TUDOR ARCH. OX-EYED. HANCHED. TREFOILED ARCH. 1. 4.

It will be needless here to investigate the *origin* of the Pointed arch. Pointed and circular arched forms constructed with horizontal beds and oversailing courses, have been found, as at Meroë; sepulchral chambers at Mycenæ; in Greece, Etruria, and Asia Minor; it was prevalent among the Pelasgians; appears in a pyramid in Egypt: and a voussoir to a drain at Nimroud, and tunnels by the Assyrians. Most publications on the general *History of Architecture* treat on the subject more or less; and the following writers do so according to the prevailing notions of their time. In *England*: Wren, *Parentalia*, 1750; Pownall, 1789, in the ARCHÆOLOGIA; Young, in *Trans.* of Royal Irish Academy 1790; Bentham 1800: Grose 1800: Warton 1800: Dalloway 1806 and 1833: Saunders 1807: Beazley 1808: Millers 1808: Kerrick 1809, in the *Archæologia*: Whittington 1809: Milner 1811 and 1835: Hall 1813: Hawkins 1813: Haggitt 1813: Harrod 1816: Kendall 1818 and 1842: Gunn 1819 and 1822, in the ARCHÆOLOGIA, xx, 537: SMIRKE 1826 in ditto: Bell (in Ireland) 1829: W. B. Clarke 1832: H. T. Hope 1835: Fergusson, etc.

Foreign writers, as FRISII, *Sopra l'arch. Gothique*, 1766. ANCILLON, *Dissertation*, 12mo., Berlin, 1701, p. 30.

Viollet le Duc in his *Dict. de l'Arch.*, iv, 25-31, writes that the origin of the Pointed arch was due to architects finding "that semi-circular vaulting yielded inwards at the crown and outwards at the shoulders. With a view to remedy this they raised the crown to a point, depressing the shoulders to a flatter curve, the resulting section being almost exactly that of the two intersecting segments of circles, the form which was finally adopted". SELVATICO, *Sulla Architectura in Venezia*, 8vo., Venice, 1847, p. 90-2, states the thrust of a pointed arch to be three-sevenths that of a semi-arch, and the support to be three-fourths. THRUST. BUILDER *Journal*, 1854, xii, 34, gives Derick's trefoiled arch to counteract the thrust of a pointed arch.

POINTED ARCHITECTURE. The phases of that manner of building in which the pointed arch is the distinguishing feature, that prevailed in a great part of Europe from the XIII to XVI cent. The *history* of the subject in each country has been treated in some measure in the respective articles herein, and of the periods or phases into which they may have been subdivided by writers: also of particular portions of details, and of material, as BRICK CONSTRUCTION. In Spain and Portugal it was called MAZONERIA: CRESTERIA or obra nueva. In England, the style has also been called GOTHIC; MEDIÆVAL; and CHRISTIAN (BUILDER *Journal*, 1851, ix, 480); and ENGLISH, ARCHITECTURE. Its NOMENCLATURE and classification by Britton, Millers, Rickman, and by Sharpe (as in *Window Tracery*, 1849, p. 8; and *Seven Periods, etc.*, 1851; and B. *J.*, ix, 356), are detailed s. v. English. Others are as follows:

CARTER gives First Style from 1245: Second Style, class 1 and

2: Third Style; Henry III, class 1; Edward III, class 1, 2 and 3; and on down to Henry VIII.

Ecclesiological (late Cambridge Camden) Society, names First pointed, Second pointed, Middle pointed, Third pointed; these terms are used by Scott, Street, and other writers.

Freeman (*Hist.*, p. 352) gives Lancet, Geometric, Transitional, Flowing (or curvilinear), and Perpendicular.

Petit gives Early Complete (including Early English and Geometric) and Late Complete (the Decorated).

Paley (*Manual*, 1846, p. 30) gives Transition, 1170-1200. First Pointed, 1200-1240 (also the Early English style). Late or Florid First Pointed, 1240-1270. Geometric Middle Pointed, 1270-1330 (Geometric or Early Decorated). Complete Middle Pointed, 1330-1380 (Pure or flowing Decorated). Third Pointed, 1380-1485 (Perpendicular). Florid Third Pointed, 1485-1546 (Tudor).

The controversy on a better classification than Rickman's of English works, between Sharpe, Parker, Scott, Freeman, and Garbett, occurred in Builder *Journal*, 1851, ix, 356, 386, 418, 430, 446, 464, 480, 512, 557, 590, 619, 655, and 702.

Parker (*Introduction to Gothic Architecture*, 1849), writes, "The change from one style to another was not immediate; it generally took a quarter of a century to effect the transition, and the last quarter of each of the five centuries, from the xi to the xv, was such a period of change or transition. Prior to the xi cent. the buildings are few and unimportant. To the xi cent. belong the greater part of the buildings supposed to be Saxon; in the last quarter, the Norman style was introduced;" etc.

Scott (*Introduction* to Catalogue of the Architectural Museum) names, Anglo-Norman, 1066-1189. Transition, 1160-1200. Early English Gothic, 1199-1272. Middle English Gothic, 1272-1377. Late English Gothic 1377-1546.

A complete series of the best examples, showing the succession of the style in England, is stated in King, *Eastern Cathedrals*, s. v. Ely Cath., p. 202, to comprise:—Choir of Lincoln Cathedral, 1186-1200; nave of ditto, 1209-1220; eastern part of choir, Ely cathedral, 1229-1254; presbytery of Lincoln cathedral, 1256-1283; west bay of choir, Ely cathedral, 1345-1362. Definite styles of mediæval architecture are stated to prevail in some counties in England, as the Norman in Kent; the Early English in Sussex; mostly Perpendicular in Somerset, Devon, and Dorset; the Decorated is rare in these and some other counties; Archæological Journal, 1848, v, 347. The development of the styles is exhibited at Lichfield (p. 75). Gloucester cathedral comprises early instances of the introduction of each style; Willis, in Builder *Journal*, 1860, xviii, 580: Repton, *Shape of the Arch* as used therein, *idem*, 1846, v, 387: *Mediæval architecture in particular districts*, *idem*, 1872, xxx, 979.

As to the fact of no written rules on Pointed architecture being found in any religious houses in this country or on the continent; Freemasons' Quarterly Review, 1837, iv, 114. The MS. of Vitruvius was largely copied previous to its *editio princeps* in or about 1486. The only mediæval description of geometric construction remaining is that of Roriczer, *On Pinnacles*, 1486, translated in *Detached Essay*, 1848-52. Drawing.

Pointed architecture. Pugin, *True Principles, etc.*, 4to., 1841. Petit, *Principles of Gothic Arch.*, 8vo., 1841 and 1846. British Quarterly Review, *Æsthetics of Gothic Architecture*, No. 19, Aug. 1849. Builder *Journal*, 1857, xv, 692, 706, 741, by Ashpitel and Scott; also xvii, 5, 23. 1.

English Pointed architecture: in addition to books named English Architecture. Carter, *Ancient Architecture of England*, fol., 1837. Rickman, *Attempt to discriminate the Styles*, 8vo., 1862, 6th edit. Britton, *Arch. Antiq. of Great Britain*, 4to., 1807-14. Pugin, *Specimens*, 4to., 1823. Pugin, *Examples*, 4to., 1831: and Nash, *Series of Views to* ditto, 4to., 1830. Brandon, *Analysis*, 4to., 1847. Parker, *Intro. to the Study of Gothic Arch.*, 12mo., Oxford, 1849. Scott, *Lectures on rise and development of mediæval architecture*, 8vo., London, 1879. Colling, *Details of Gothic Arch.*, 4to., 1851-56. Penny Cyclopædia, s. v. Gothic. Paley, *Manual of G. Arch.*, 8vo., 1846; and *Manual of G. Moldings*, 8vo., 1865. Sharpe, *Architectural Parallels*, fol., 1845-48. King, *Handbook to the Cath. of England*, 8vo., 1861-69. Turner and Parker, *Domestic Architecture*, 8vo., 1851-53-59. Eastlake, *Gothic Revival*, 4to., 1872. Parker, *English Origin of Gothic Architecture*, in the Archæologia, xliii, 4to., 1870; Street, *Encyc. Britt.*, 9th edit., 1877. 1

Billings, *Baronial and Eccles. Antiq. of Scotland*, 4to., 1848-52. Walcott, *Ancient Church of Scotland*, 4to., 1874. Anon., (Muir), *Churches of Scotland*, 8vo., London, 1848.

King, *Handbook to the Cath. of Wales*, 8vo., 1873.

Bell, *G. Arch. in Ireland*, 1829; Petrie, *Eccles. Arch. of Ireland*, 4to., 1845. Wilkinson, *Geology, etc.*, 8vo., London, 1845. Wakeman, *Handbook of Irish Antiq.*, 8vo., 1848. Brash, *Eccles. Arch. of Ireland to the close of* xii *cent.*, 4to., Dublin, 1875.

French Pointed Architecture; in addition to the books named French Architecture. Laborde, *Monumens de France classés chron.*, fol., 1816. Nodier et Taylor, *Voyages Pittoresques de l'ancienne France*, 14 vols., fol., 1820-46. Jolimont et Chapuy, *Les Cathe. de France*, fol., 1826-31. Chapuy et Ramée, *Le Moyen Age Monumentale*, fol., 1840-44. Moret et Chapuy, *Le Moyen Age Pittoresque*, fol., 1857, etc. Webb, *Cont. Ecclesiology*, 8vo., 1848. Lenoir, *Arch. Monastique*, 4to., 1852-56. *Archives de la Commission des Monts. Historiques*, fol., 1856-76. Viollet le Duc, *Dictionnaire Raisonnée*, 10 vols., 8vo., 1853-68; and *Arch. Militaire du Moyen Age*, transl., 8vo., 1860. Labarte, *Hist. des Arts Indust. au Moyen Age, etc.*, 4to., 1864-6. Lacroix, *Les Arts au Moyen Age, etc.*, 4to., 1869-1872. 1.

Belgium: Schayes, *Essai sur l'arch. Ogivale*, 4to., 1840; 2nd edit. 1853: see transl. in Weale, *Quarterly Papers*, 4to., 1845. De Jong, *Cont. to the knowledge of Gothic style in the Netherlands*, fol., 1847. Maquardt, *Mons. d'arch.*, fol., 1854.

Switzerland; see Basle. Blavignac, *Hist. de l'Arch. Sacrée du* iv *and* x *siècle*, 8vo., 1853-4.

De Vogüe, *Syrie Centrale du* i *au* vii *siècle*, 4to., 1867.

German Pointed architecture, in addition to the books named German Architecture. Puttrich, *Denkmäler der baukunst in Sachsen*, fol., 1835-42. Hoffstadt, *Gotische A B C Buch*, fol., 1840-43: and *Principes du Style Gothique*, fol., 1847. Popp et Buleau, *L'Arch. Gothique et son Origine*, fol.; and *Les trois Ages de l'Arch. Gothique*, fol., 1840. Webb, *Cont. Ecclesiology*, 8vo., 1848. Moller, *Denk. der Deutschen baukunst*, fol., 1851-52. Quast, *Denk. der baukunst in Preussen*, fol., 1852, etc. Statz, *Recueil des Eglises et des Constr. relig. dans le style Gothique*, fol., 1853; and *Détails Gothiques, etc.* Reichensperger, Statz, und Ungewitter, *Gothic Model Book*, fol., 1859. Förster, *Monuments d'Arch.*, fol., 1859-60. King, *Study Book of Mediæval Arch.*, 4to., 1860. Weerth, *Kunstdenkmäler des Christ. Mittel. in den Rheinlanden*, fol., 1866. Lubke, *Eccles. art in Germany*, transl., 8vo., 1873. Adler, *Mittel. Backstein Bau des Preusischen Staats*, fol., Berlin, 1866: and Heider, Eitelberger, etc., *Mittel. Kunst. des Oesterreichischen Kaiserstaates*, fol., Stutt., 1858-60. 1.

Italian Pointed architecture; in addition to the books named Italian Pointed Architecture. Cappelletti, *Le Chiese d'Italia*, 8vo., 1847. Schulz und Quast, *Denkmäler der Kunst des Mittelalters in Unter Italien*, fol., 1860. Okeley, *Development of Christian Arch. in Italy*, 8vo., 1860. G. Knight, *Saracenic and Norman Remains*, fol., 1846. De Luynes, *Recherches sur les Mons. des Normands*, fol., 1844. Ruskin, *Stones of Venice*, 8vo., 1851-53, ii, 234; 281. Perkin, *Tuscan and Italian Sculptors*, 4to., 1865 and 1869. Rohault de Fleury, *La Toscane au Moyen Age*, fol., 1868-69. Salazaro, *Etudes sur les Mons.* xiii *au* xiv *siecles*, fol., 1872.

Spanish Pointed architecture: Escosura and Villa Amil, *L'Espagne Artistique, etc.*, fol, 1842-59. Da Silva, *Diss. Artistique sur l'Arch. en Portugal* xii *au* xviii *siecle*, 8vo., 1869; and *Notice Hist. et Artistique des principaux Edifices Religieux en Portugal, etc.*, 8vo., 1873. Street, *Gothic Arch.*, 8vo., 1865. Lozano, *Antiguedades Arabes de España*, fol., 1804, etc. Lucas, *Arch. en Portugal*, 8vo., Paris, 1870.

POINTED ARCHITECTURE (Late). This list is intended to include buildings erected in the Mediæval style after the period of the Reformation, and is in continuation of the article Perpendicular period ending 1534 at the suppression of monasteries by king Henry VIII, but it excludes the Tudor period or Domestic works, and those executed in the Elizabethan manner.

15 and 16 cent. Norman work reproduced in Cornwall; Building News *Journal*, v, 399.
1472. Wrexham Church, Denbighshire. Tower, 1506.
1490-1547. Leake church, Lincolnshire. Tower.
1499-1616. Bath Abbey church, Somersetshire.
1509. Oxford, Brasenose college. Tower.
1510. Oxford Cathedral; Choir roof, groining curious.
1518. London, Lincoln's Inn, Chancery Lane. Gateway.
1519. Great Ponton church, Lincolnshire.
1520. Bolton abbey, Yorkshire. Lower part of west tower.
1521-24. Lincoln cathedral. Bishop Longland's chapel (died 1547).
1521. Cambridge, S. Mary's church. Rood loft.
1524. Barnoldswick church, near Kirkstall, Yorks. Tower.
1524. Marystow church, Devonshire.
1529, before. Windsor, S. George's chapel. The Queen's closet.
1529. Oxford, Baliol college. The chapel.
1531. Hampton Court palace. Roof of great hall.
1532. Canterbury cathedral. Archb. Wareham's tomb.
1533. Ely cath. Bishop West's chapel (1515-33), Lower part, ceiling Italian.
1534. Cambridge, King's College chapel. Organ screen.
1535. Sefton church, Lancashire.
1540. *cir.* Winchcombe church, Gloucestershire.
1542. Coventry; new Cross.
1562. *cir.* Sunningwell church, Oxfordshire, for Bishop Jewel (1560-71).
1567. House near Burton abbey, Worsborough, Yorkshire.
1570. *cir.* Probus church, near Truro, Cornwall. Tower. (Exeter Arch. Society, *Transactions*, iv, 19).
1571-75. Kenilworth, Warwickshire. S. side of Court and N. great gate.
1581. High Legh, parish of Rosthorne, near Knutsford, Northamptons.
1610. Fulmer church, Bucks.
1616. Oxford. Exeter college; and chapel 1624.
1617-23. London. Lincoln's Inn. Open cloister under chapel.
16...-31. Oxford. Lincoln college.
1620-37. Oxford. Oriel College.
1623. London. S. Giles'-in-the-fields church (rebuilt).
1627. *cir.* Smisby church, Leicestershire. Linen pattern paneling in tower and east end of chancel.
1627. South Malling church, Sussex.
1628-33. Londonderry cathedral.
1634. Leeds. S. John's church. Decorated in character.
1634-5. Oxford. University college, hall 1657; and chapel; library 1669.
1640. Oxford. Christ Church college, staircase and entrance, with fan tracery vaulting from central shaft.
1640. Oxford. S. Mary's hall, hall and refectory and chapel over.
1640-46-58. Plymouth church.
1629-31. Hammersmith church, Middlesex.
1630. London. S. Katherine Creed church, Fenchurch Street.
1631-2. Higham Ferrers church, Northamptonshire. Spire.
1631-5. Oxford, S. John's college. The second quad.
16...-32. Stanmore Magna church, Middlesex.
1653. Staunton Harrold church, Leicestershire.
1657. Little Ponton church, Lincolnshire. West front rebuilt.
1660-72. Bishops Auckland, Durham. Part of palace.
1661-78. Lichfield cath. Centre spire, etc.
16...-63. Oxford. Brasenose college; Library chapel.
1663. Lismore cathedral, Ireland.
1663. Lambeth palace. Great Hall.
1674. Hanley castle church, Worcestershire. Chancel, Tower, and chancel aisle.
1676. Ingestre church, Staffordshire.
16...-82. Oxford. Christ church; Tom tower.
16...-1722. London. S. Michael's church, Cornhill; Tower.
1681-2. London. S. Mary Aldermary (not 1711).
1680. Islip church, Oxfordshire. Chancel rebuilt (now destroyed).
16...-85. London. S. Alban's, Wood Street.
1690. Sherston church, Wiltshire. Tower.
16...-1699. London. S. Dunstan's in the East, Tower and spire.
1699-1708. Oxford. All Saints church, Tower and spire.
1700. Dursley church, Gloucestershire. Tower (fell 1699); chancel rebuilt 1738.
1722-3. London. Westminster abbey. Solomon's porch rebuilt; great west window and upper part of towers.
1753-76. Strawberry Hill, Middlesex, by Horace Walpole.

List of churches rebuilt, etc., since 1676 in Worcestershire, Associated Societies, *Reports and Papers*, 1862, p. 235.

Later edifices; see T. Holt, I. Jones, Sir C. Wren, L. Brown, Hawksmore, Kent, Muntz, James. Work at Oxford, in Archæological Journal, viii, 390, 395. Poole, *Hist. of Eccles. Arch. in England*, 8vo., 1848, p. 381. Dallaway, *Anecdotes of the Arts in England*, 8vo., 1800, p. 453. Eastlake, *Hist. of the Gothic Revival*, 4to., Lond., 1872. Britton, *Toddington*, fol., Lond., 1840, p. 7, etc. Walpole's Vertue, *Anecdotes*, temp. Geo. II, iv, 322; 1862 edit., p. 836. British Critic Review, 1840, p. 487, with cuts. Edinburgh Review, 1839, lxix, 103, by Palgrave.

Late Pointed architecture, after the flamboyant style in France. Franquart. Kelderman. Durant.

1532-1642. S. Eustache at Paris, Italianized details.
1575? Beauvais cathedral, rich transepts and large central tower.
cir. 1548. Roscoff, North Brittany; S. Ninian church for Mary Stuart of Scotland on her landing; English work of xiv cent.
1723. Orleans cathedral, facade, etc., by — Gabriel and others.

Gothic school in 1635 at Milan, in Handbook, edit. 1843, p. 158. Lartigue published a design 1776.

POINTED ARCH-SECTIONED DOME. In pottery, at Neuvy, by Viollet le Duc, given in Isabelle, *Edifices Circulaires*, fol., Paris, 1843, pl. 41-2. At Sultanieh, the bricks of the cupola are laid horizontal; *idem*, p. 110, note. Pendentive.

POINTED WORK; see Chiselled Work; Broached Work, Ashlar; Bretture or Diamond Hammer; Granite.

POINTELL; see Poyntel.

POINTING (Fr. *briqueter*). New brickwork when left plain is sometimes finished on the outer face with the beds and joints of mortar as described s. v. Brickwork (p. 147). When the work is required to have a more finished appearance, or the old joints have been washed out or decayed, the work is done as described s. v. Tuck and pat pointing; and s. v. Bastard tuck pointing. In *old work*, pointing generally includes raking out the old mortar, replacing the same with new and a fine mortar worked in carefully, colouring the whole work, and white lining the beds and joints. The joints are sometimes filled in with cement. Good pointing principally depends on the joints being first well and carefully raked out, broomed, and watered. Hick or High joint. Mortar joint and bed. Langley, *Builder's prices*, 8vo., London, 1750, p. 99; 127-9; 329. Pasley, *Limes, etc.*, 8vo., London, 1838, §12, 13, 20, who suggests that pointing to walls built with chalk lime mortar should not be done for some years after having been built. Denison, *Lectures on Church Building*, 1869; Building News *Journal*, xvi, 534. 25.

Pointing is also done to the outside of pan tiling; to the edges of plain tiling when the slope of the roof is not sufficient to prevent the wet getting under the tiles; and to the underside of slating; Hoskins, *Clerk of the Works, etc.*; and Building News *Journal*, 1876, xxx, 79. The rules of the Ecclesiastical Commissioners for England, applicable to parsonage houses, require "the interior of roof coverings to be pointed".

Pointing as done early in the xiii cent. in England, appears to have been the imitation of ashlar work on the plaster surface of internal walls; Turner and Parker, *Domestic Arch.*, 8vo., London, 1853, ii, 25. "Punctuacio; punctura; the pointing of a wall; the filling up the chinks of the masonry with lime"; Surtees Society, *Finchale Priory*, 8vo., Newc., 1837, ccccxliii.

POINTING MORTAR, for outside work, was in 1750 stated to be made of 1 heaped bushel of clean sharp sand, or of clean sea coal ashes, mixed with 2 heaped bushels of unslacked lime, and well beaten and worked up hot. Langley, *Builder's Prices*, 8vo., London, 1750, p. 326. The blue pointing mortar is composed of greystone lime slaked by air, passed through a fine sieve, and mixed in the proportion of 2 of lime to 3 of sand, with 6 lbs. of lampblack to about 7 or 8 hods of the stuff, with 1 part of smith's ashes; it requires great labour to be well mixed. The red pointing mortar is produced by a mixture of Spanish brown

and yellow ochre, instead of lampblack: Donaldson, *Stucco*, p. 169. One sixth part of lampblack and black sand from a foundry is recommended. It is also stated that blacksmith's ashes sifted fine is best and strongest, mixed with Portland cement 4 to 1, Aberthaw lime 3 to 1, and grey Plymouth lime 2 to 1; for lampblack is of a greasy nature and rather tends to destroy the strength of the mortar.

POINT OF SIGHT. In perspective; the principal vanishing point, because all horizontal objects that are parallel to the middle visual ray will vanish in that point. The place of the eye whence the picture is viewed, according to Brook Taylor; but the old writers state it is what is now called the centre of the picture. It is also called the point of view. 1.

POINT OF SUPPORT. An isolated mass or masses in a building, which sometimes carry great weights on a small superficies. Hence a knowledge of the strength of materials becomes of great consequence. Gwilt, *Encyc.*, 1867 and 1876 edit., s. v. in index.

POISE OF GLASS; see Glazier (p. 50).

POISSANT (Thibaut), also a sculptor, was elected 17 March 1663 a member of the academy of sculpture and painting at Paris, where he died 16 Sept. 1668, aged 63 years. Herluison, *Actes d'Etat Civil, etc.*, 8vo., Orleans, 1873, p. 358, gives an entry "Mr. Poissant, architecte", buried "4 April 1669".

POISSON (Abel François), born 1726 at Paris, marquis de Ménars et de Marigny, was directeur-général des batimens du roi, from 12 Oct. 1754 to 27 July 1773. He died 11 May 1781.

POITEVIN (Arnoult), executed 1647 the retable of the high altar in the church of S. Honoré at Paris. Lance, *Dict.*

POITEVIN (Arnoult Séraphin), conseiller architecte et ingénieur du roi, died at Orleans 21 Oct. 1720. Lance, *Dict.* This is probably the Poictevin who was admitted 1700 a member of the Academy of Architecture at Paris, and died 1719 or 1720.

POITEVIN, Poidevin, or Podevin (Pierre Alexandre), born 1782 at Bordeaux, was a pupil of Percier. For the department of Lot et Garonne he designed the palais de justice at Agen; the prisons, with the palais de justice and the hotel-de-ville at Marmande; enlarged the hospice there: and the maison centrale de détention at Eysses. In 1810 he was appointed one of the executive committee to carry out the abattoir of Montmartre, at Paris (*Detached Essays*, Abattoir), commenced by Belanger. As architect to the department of the Gironde, he reconstructed after the storm of 1820 the vaulting of the cathedral at Beauvais; inserted the timber work to the spires to strengthen them; and designed the sacristies. In 1823 he designed the presbytery at Langon (i, pl. 2); 1825-27 restored the château Cardillac for the maison de correction de femmes; designed the hôpital d'aliénés in the same town (ii, 89-90; 158); 1825 the lazarette Marie Thérèse at Trompeloupe, near Painillac (ii, 101-2); at Bordeaux, the marble pedestal for the statue of Louis XVI; S. Nicolas parish church; with the tomb of archbishop Daviau in the cathedral; and the stables of the royal dépot d'étalons at Libourne. He improved the drainage of the city; restored many of the churches and public edifices; designed the Gothic façades to the churches of S. Eloi and of S. Seurin; 1829 the two rostral columns to the terrace of the place Louis XVI, and many mansions; and 1828 a large timber pavillion in the royal gardens for the entry for the duchesse de Berry. He was professor of architecture at Bordeaux, where he died in or about 1862. Lamothe, *Deux Artistes Bordelais*, 1862. Gourlier, etc., *Choix d'Edifices publiques*, fol., Paris, 1825-50, the plates in which are referred to above. 110.

POITIERS and POICTIERS (the Gaulic Limonum, chief city of the Pictavi). The capital of ancient Poitou, and the present capital of the department of Vienne, in France, situated on the rivers Clain and Boivre. There are scanty remains of an amphitheatre, internally 264 ft. by 210 ft., and externally 426 ft. by 375 ft.; De Caumont, *Cours d'antiq.*, 8vo., Paris, 1838: its oval is now occupied by the market; Dufour, *Hist. de Poitou*, quoted in Richard et Hocquart, *Guide du Voyageur*. Four or five arches of an aqueduct are to be seen about 1½ miles distant. The kings of England were dukes of Poitou until 1371. The cathedral, dedicated to S. Pierre, was founded 1161 by king Henry II of England; part of the east end remains, the rest dates up to 1349 when the edifice was completed, except the west façade, which begun *cir.* 1250 was carried on in the xiv and xv centuries. The plan converges eastwards. The three ailes are nearly of equal height; the transepts are merely chapels. Some damage occurred to the edifice in 1562, and it was being restored 1853-56; Athenæum *Journal*, 1856, p. 1247: Auber, *Hist. de la Cath.*, 2 vols., 8vo., Paris, 1849: Viollet le Duc, *Dict.*, gives a plan; also details of many edifices. The church of Notre Dame la Grande, founded middle of xii cent. by William IV duke of Aquitaine, is said to be a copy of Ste. Croix at Bordeaux, or vice versa; the vaulted nave is 187 ft. long, 44 ft. wide, and about 54 ft. high: the chapel of S. Anne is xv cent.: Daly, *Revue Générale*, v, 251; xiv, 53; Laborde, *Monumens*, fol., Paris, 1816, pl. 128-9; Johnson, *Early French Architecture*, fol., Newc., 1864. Du Sommerard, *Les Arts du Moyen Age*, fol., Paris, 1838-46, Atlas, chap. 3, pl. 1.

The crypt of S. Radegonde abbey church is partly excavated in the rock; the choir above it with polygonal apse and chapels was burnt 1084 and re-dedicated 1099; a wide aileless nave has domical vaulting; the transepts are xii cent., the lower part of the tower xi cent., the porch and some internal decorations xv cent.; the sacristy is of great interest; Daly, v, 251; Johnson, *Early French Arch.*, fol., 1864. Le Temple de S. Jean, originally a baptistery, then a church, and next a *musée*, is 40 ft. by 25 ft., and may date from vi or vii cent.; it is one of the most ancient Christian monuments in France; Gailhabaud, *Monumens*, 4to., Paris, 1842-52, ii; Daly, xiv, 178-9; Building News *Journal*, 1866, xiii, 817. S. Hilaire was burned 732 by the Saracens, its reconstruction directed by G. Coorland, and consecrated 1049; a large part of the nave was destroyed during the revolution; there are plain barrel vaultings; a dome occurs at the crossing; the apsidal choir has an aile; the western part of the edifice is lower by thirteen steps than the eastern; the structure was being restored 1876. S. Jean de Montierneuf, 1066-87, consecrated 1096, was founded by William Guy Geoffrey, duke of Aquitaine and count of Poitiers, died 1086, who is buried in the nave; the edifice was injured during the revolution. S. Porchaire, *cir.* 1068, is good Romanesque; Building News *Journal*, 1868, xv, p. 144. Of S. Nicolas priory church, 1049, only portions remain.

The castle of the contes de Poitou, xiii cent.; repaired xiv cent., was restored lately by de Mérindol for the courts of justice; Verdier et Cattois, *Arch. Civile*, 4to., Paris, 1857, ii, 193; the salle des pas perdus is of the xii cent., the open roof xv cent.; the interesting triplet of fireplaces, stairs, and tribune with windows over, with other details, are in Viollet le Duc, *Dict.*, iii, 203: who likewise gives, v, 527, the fontaine sur le Clain. An old house called Le prévoté is in the street of the same name. Near the city is the famous *pierre levée*, about 20 ft. long, 15 ft. wide, and 3 ft. thick, raised about 3 ft. 6 in. from the ground; Laborde, *Monumens*, pl. 3; Brouillet et Meillet, *Epoques Antédiluviennes et Celtiques du Poitou*, 8vo., Poitiers, 1864: and the curious Romanesque church of S. Savin with its painted crypt; Daly, xi, 9; view in Building News *Journal*, 1869, xvi, 387; Hubsch, *Altchristl. Kirchen*, fol., Carls., 1858-61, pl. 48. 14. 15. 23. 28. 50. 96.

Civil Engineer, etc., *Journal*, 1839, iii, 144; 221: and Godwin, *Pen and Pencil Sketches in P., etc.*, 1842, v, 69; 113-5. Thiollet, *Mons., etc., de Haut Poitou*, fol., Paris, 1823. Auber, *Inst. Arch. sur la restoration, etc., des Eglises*, 8vo., Paris, 1851. Noel, *Souvenirs pitt. du P., etc.*, Paris, 1828. Inkersley, *Romanesque, etc., Arch. in France*, 8vo., Lond., 1850. Picton, *Churches in P.*, in Builder *Journal*, 1853, xi, 35.

POL or Paul de Léon; Saint. A town of Brittany, in France; the see of a bishop now united with that of S. Brieuc.

The cathedral is dedicated to S. Pol; its nave (early, *Handbook*) late XIII cent., is 260 ft. long and 52 ft. high; the choir finished about 1431 (Flamboyant) has double ailes, and good XVI cent. choir stalls. The transepts are Romanesque; in the south one is a good Decorated round window of granite. The two western towers form a vestibule similar to that at Peterborough, and have open but dissimilar stone spires; restored 1866. A Florid porch is of Kersanton stone. The church of Notre Dame de Kreizker, dating 1345-99, has a nave and an aile, transepts, choir, and an aile chapel. The square tower and granite open-work spire 260 ft. (most books say 393 ft.) high, is said to have been designed by an Englishman. The two churches, with a Bonehouse, in the cemetery, an old manor house, and several dolmen near, are given in NODIER AND TAYLOR, *Voy. Pitt.* (Bretagne), fol., Paris, 1845-46, ii, with views of Folgoët, Roscoff, and contiguous places. BUILDING NEWS *Journal*, 1861, Dec.; BREWER, *Churches of Brittany (North Coast)*, in ROY. INST. OF BRITISH ARCHITECTS, *Transactions*, 1872-73, p. 175-7. CHENU, *Arch. et Epis. Galliæ*, p. 156. 28. 50. 96.

POLA. A town of the circle of Istria, in Illyria, situated on a bay of the Adriatic. Destroyed by Cæsar, it was rebuilt by Augustus (B.C. 31—A.D. 14) who named it *Pietas Julia*; under Septimius Severus (193-211) it contained numerous fine edifices, and its port was one of the great naval stations of Rome; 1228 the town was destroyed by the Venetians; 1378 inhabited by the Genoese; and since 1849 the Austrians have erected a large government palace, fortifications, with arsenals, a basin, and docks, under — Gilbert, an American engineer. The Corinthian temple to Augustus and Rome, 31 ft. by 62 ft., is now a museum. A few remains of the temple to Diana, or more probably the *curia*, were enclosed in the palace of the Venetian governor, which is now the palazzo publico; the small Corinthian arch of Sergius Lepidus is now called porta Aurea or Aurata (SERLIO, *Archit.*, fol., Venice, 1663, p. 198-201). Outside the city is a *nymphæum*, and the porta Ercola: and near them the amphitheatre, still in good preservation, having four towers probably for staircases; it is 436 ft. by 346 ft. (*Handbook*); or 452 ft. by 369 ft. (TEXIER), (SERLIO, p. 149-51; GAILHABAUD, *Monumens*, 4to., Paris, 1842-52, i). A theatre was destroyed 1636 for the citadel, and is only known in SERLIO, p. 128-131; and in GWILT, *Vitruvius*. The *porta Gemina* was discovered 1845, and near it another arch. The cathedral, dedicated to the Virgin, dates from about 857 (D'AGINCOURT); it was dedicated 12 Sept. 1060, and is chiefly XV cent.; many ancient fragments are built in it. (ISTRIAN STONE.) There are two other old churches. A Franciscan monastery, XIII cent., now a military bakehouse, has a good cloister and a Byzantine west portal. The church on the island of S. Catarina is a very ancient Byzantine structure with a dome.

ADAM, *Arch. Remains*, with plates by Clerisseau, 8vo.; CARLI, *Relazione delle scoperte fatte nell' Anfiteatro*, 8vo., 1750. RICHARDSON, *Treatise, etc., and Observations on Antiq.*, fol., Lond., 1787. CASSAS AND LAVALLÉE, *Voyage Pitt., etc., de l'Istrie*, fol., Paris, 1802, ii, pl. 65. STUART AND REVETT, *Antiq. of Athens*, fol., London, 1816, iv; and HITTORFF'S *Translation*, fol., Paris, 1808-22. ALLASON, *Antiq. of Pola*, fol., London, 1817. STANCOVICH, *Dello Anfiteatro*, 8vo., 1822. TATHAM'S drawings at South Kensington Museum. KANDLER, *Cenni al forestiero che visita Pola*, Trieste, 1845; UGHELLI, *Italia Sacra*, v, 474, x, 325. WEYDE AND HAUN, *Die römischen Baudenkmäler zu Pola*, 6 pl., fol., Berlin. NEALE, *Notes Eccles. and Pict. on Dalmatia, etc.*, 8vo., London, 1861; and ECCLESIOLOGIST *Journal*, 1861, XX. NELSON, *Antiq. of Pola*, in Roy. Inst. of Brit. Archts., *Sessional Papers*, 7 Ap. 1851, with drawings by A. Glennie, now in the library of the institute, with others by J. Stuart. STRANGFORD, *Eastern shores of the Adriatic*, 8vo., London, 1864, p. 288-90. DALY, in *Revue Générale*, 1852, x, 14, 16, and 30; the amphitheatre, and church of S. Marie de Canedo. R. H. R., *Rambles in Istria, etc.*, 8vo., 1875, p. 67. 1. 2. 14. 50. 25, 28.

POLACK (L.); see POLLACK or POLLAK (L.).

POLANARRUA; see POLLANARRUA, in Ceylon.

POLAND; ARCHITECTURE OF. (Lat., *Sarmatia;* Polish, *Polska;* Ger., *Polen;* Fr., *Pologne.*) Its principal cities *were* CRACOW, its ancient capital; Sandomir, Opatow, Kalisch, LUBLIN, PLOCK, PULTUSK, Modlin now called NOVOGEORGIEVSK, WARSAW, Lowicz, Siedlec, Suwalky, Neustadt (Nowemiasto), and Augustowo. Partitions took place 1772, 1793, 1795, and 1815; its last king died 1798; and the republic of Cracow was added 1846 to Austrian Galicia. (POSEN). The name "kingdom of Poland" is however still given to a portion of the Russian territory. The chief towns *now* are WARSAW, RADOM, LUBLIN, PLOCK, and Augustowo.

Besides the above towns as described herein, it may be useful to note the following introductions of styles, reflexes of the adjoining countries. Kasimir, son of Miéczyslas II, king of Poland, who was driven from the throne after the death of his father in 1034, became, under Maieul, deacon in the monastery of Cluny; recalled to Poland in 1040 he created and endowed several monasteries, which he filled with monks from Cluny; he died 1058: VIOLLET LE DUC, *Dict. Rais.*, i, 251. Kasimir III the great (1333-70), made such great improvements that the chroniclers state he found Poland built of timber and left it of stone; he rebuilt many cities, and repeopled them from foreign settlers; Louis I of Hungary succeeded (1370-1382). Sigismund, duke of Troppau in Silesia, grandduke of Lithuania, king in 1506, exercised influence over Bohemia and Hungary: his second wife, Bona, daughter of John Galeazzo Sforza, last duke of Milan, introduced into Poland many Italian refinements and the Spanish courtesy, which rendered the court one of the most brilliant and refined in Europe: he died 1548.

The best history of art in Poland is probably to be found in ENCYKLOPEDYIA POWEZECHVA, 8vo., Warszawa, 1865, XXI, 146-158. CIAMPI, *Notizie — Artisti Italiani in Polonia, etc.*, 8vo., Lucca, 1830; and *Viaggi in Polonia con App. di Artisti Italiani in Polonia*, 8vo., Fir., 1831, p. 189, gives the following names of architects and their works, many of whom are noticed in this dictionary:

Fil. Barigione	Dom. Merlini	And of Poland—
Giov. Bellotto	Perti	P. Aigner
Gio. M. Bennardoni	Rodolfino da Camerino	Degen
Ant. Corazzi	Rossi	A. Idzokowski
Fontana	Sacchi	Kubichi
Francesco	D. Scamozzi	Lesel
S. Genga	Solari	Metzel
Itar	G. Succatori.	Schuch
E. Marconi		Zawadzki, and
		Woydzko.

Also his *Notizie dei Secoli XV e XVI sull' Italia, Polonia e Russia*, 8vo, Fir., 1833.

CHODZKO, *La Pologne Historique, Litt., et Mont.*, in EAST, *Hist. de la guerre, etc.*, 7th ser., 4to., Paris, 1855-56, and p. 94 gives the following list of architects, many of whom are noticed in this dictionary:

Oct. Woloner, 1103-70	Ephraim Schroeder, 1727-90
Pierre Arler, 1300-75	Michel Kado, 1768-91
Stoss or Stwosz (Wit), 1447-1533	Laurent Gucewicz, 1753-98
André, 1470-1540	Gabriel Gruber, 1738-1805
Jean Michalowicz, 1520-80	Michel Szulç, 1772-1812
Janus Dluski, 1550-1620	Pierre Aygner, 1780-1820
Pierre Beber, 1630-95	Albert Jaszczold, 1763-1821
Isidore Afayta, 1635-1700	Jean Luitzsay, 1759-1822
Tyllmann, 1640-1703	Sebastien Sierakowski, 1770-1824
Pierre Switkowski, 1720-86	François Miechowicz, 1783-1852

WILSON, *Travels through Russia, etc.*, 8vo., London, 1828. PEDISCHEFF, *Atlas Geog. de l'empire de Russie, etc.*, fol., 1820. JOHNSTON, *Travels, etc.*, with maps, 4to., 1815. BURNET, *View of Poland*, 8vo., 1856. ZABA AND ZALESKI, *The Polish Exile, etc.*, 8vo., Edinb., 1833. BRUUN, *Tableau de la Pologne*, new edit. by J. L. CHODZKO, 8vo., Paris, 1830. TSCHISCHKA, *Kunst und Alterthum in dem Osterreichischen Kaiserstaate*, 8vo., Vienna, 1836. SOLSKI, *Architekt Polskoi — o Fortyfikayi*, fol., Krak, 1690. SIERAKOWSKI, *Architektura, etc.*, 2 vols., fol., Krak., 1812.

IDZKOWSKI, *Compositions d'Arch. contenant des batiments de toute espèce*, fol., Paris, 1843-52.

POLCEVERA, POLCHEVERRA; see POLZEVERA MARBLE.

POLE. A measure of length; see PERCH and COLAGA.

POLE BOARD; see POLING BOARD.

POLENI (GIOVANNI), marchese, born 20 August 1683, at Venice, studied mathematics and architecture. He wrote *De castellis per aquæ derivantur fluviorum*, 4to., Padua, 1718; edited FRONTINUS, *de Aquæductibus*, 4to., 1722; wrote *De Olympico teatro*, in MAFFEI, *Gallix Antiq.*, 4to., 1734; *Lettere due critiche*, in MONTENARI, *Del Teatro Olympico*, 8vo., 1749; *Memorie istoriche della gran cupola del tempio Vaticano*, fol., Padua, 1748; *Dissert. sopra il tempio di Diana in Efeso*, in ACCADEMIA DI CORTONA, *Saggio*, i, pt. 2 (or xi); Suppl. ad GRÆVII, *Thes. Ant. Rom.*, *Exercitationes Vitruvianæ; Commentarius de M. Vitr. libris*, 4to., Padua, 1739-41; and an edition of VITRUVIUS, by POLENI and STRATICO, 4 vols., 8vo., Utini, 1825-30. Under his direction the bandages were put 1742 by Vanvitelli to the dome of S. Peter's at Rome, as recommended by the mathematicians Leseur, Jacquier, and Boscovich, described by MILIZIA, s. v. C. Fontana. DUMONT, *Basil. de S. Pierre*, fol., Paris, 1763, pl. 54. G. Chiaveri wrote 1767 a refutation of the theory. He died 13, 14, or 15 Nov. 1761, at Padua, where a statue by Canova was erected to his memory. *Memorie per la Vita, etc., di G. P.*, 4to., Padua, 1762. COSSALI, *Elogio di G. P.*, 8vo., Padua, 1813. TIPALDO, *Biog.*, x. G. DE FOUCHY, *Eloges*, année 1763. 112. 113.

POLE PLATE. The piece of timber, set square, and resting on the ends of the tiebeams of a roof, for the purpose of supporting the lower ends or feet of the common rafters. It acts in place of the purlin, which is set perpendicular to the rafters and on them. 1. 4.

POLET (ADAM), canon of the cathedral at Metz, the works at which edifice he is presumed to have directed. He died 1353, and is buried therein. LANCE, *Dict.*, 1872.

POLET or POLLET (JEAN), was employed at Metz as late as 1374. PERRAT (P.).

POLETTI (LUIGI), commendatore, born 1793 at Modena, is best known for his restoration (begun with Belli), after the fire of 15 and 16 July 1823, of the basilica of S. Paolo fuori le mure, near Rome; it was chiefly completed 1841. ECCLESIOLOGIST *Journal*, 1845, new ser., ii, 37; WEBB, *Ecclesiology*, 8vo., London, 1848, p. 538; LETAROUILLY, *Rome Moderne*, 4to., Paris, 1860, p. 692-5. He designed *cir.* 1826 the palazzo Ceccopiero; restored and transformed 1831-40 for pope Gregory XVI, the palace (at the side of the portico to the front of the church of S. Giovanni Laterano and erected 1586-88 by D. Fontana), into a museum of sculpture (LETAROUILLY, p. 491); designed 1859 the new church of S. Filippo at Nocera; 1864 the new collegio Scozzese, opposite the palazzo Barberini; the new cimiterio di Gualdo; a "grande edificio per uso di molte abitazioni private"; and the monumente del dogma, or column of the Immaculate Conception, in the piazza di Spagna, at Rome; the sculptures by Tenerani. He published *Due dissertazioni intorno alle genti e alle arte primitive d'Italia*, 4to., Rome, 1838; was ex-president of and professor of architecture in the academy of S. Luke; and died at Milan, 2nd August 1869, in his 77th year. Memoir by DONALDSON, Institute of British Architects, *Sessional Papers*, 1869-70, p. 144.

POLEY (JACOB), a very clever millwright, was town architect at Zierikzee; a colleague of J. Danckerts; and published *Architectura Civilis*, 4to., Amst., 1770, being on roofs. 24.

POLIA STONE. A fine species of stone, also called Amiantus and Corsoides, much used by the ancients. 2. 6.

POLICE COURT. An edifice destined for the trial of persons brought before a magistrate. The accommodation varies according to the size of the town. The court erected 1870 at Ipswich provides for the petty sessions; magistrates' retiring rooms, others for the attornies and witnesses, with lavatories, etc.; in rear, are six cells with a constables' sitting room, coat room, bedding store, and offices; superintendent's department, containing parlour, living room, kitchen, and five bedrooms and constables' bedroom with five beds reached by a separate staircase; BUILDER *Journal*, 1870, xxviii, 91: which work describes the courts at Manchester, by T. Worthington, 182 ft. by 117 ft., 1872, xxx, 162: and at Blackburn, by W. S. Varley, 1873, xxxi, 703; at Newcastle, by J. Lamb, £17,000, 1874, xxxii, 446, 947, with illustration; the Marylebone, 1875, xxxiii, 92; and the new Metropolitan station in Bow Street, 1879, xxxvii, 687-9, with plan.

POLICE STATION. An edifice destined for the assembling of the police and the reception of persons previous to being taken before a magistrate. The accommodation requires an office for the examination of cases, and for police arrangements; cells for male and female prisoners, each with benches, water closet, etc., a reading and sitting room; kitchen for preparing dinners for the police, lockers for clothes, a sleeping room about 21 ft. by 15 ft. by 12 feet high if for 7 beds; a room with stove for drying clothes, etc.; a room for lumber and boxes, and two rooms for a resident serjeant. Such an edifice near the Islington cattle market is described in BUILDER *Journal*, 1859, xvii, 264; which also 1870, xxviii, 583, notices a country building, having in addition a room for testing weights and measures; with stabling and coachhouse; another edifice in Kennington Road, 1873, xxxi, 984; and one at Kensington, xxxii, 160. POLICE CELLS, see PRISON.

POLIDES or POLIUS; of Thessaly, also a painter, sculptor, machinist and engineer, was the master of Diades and Cercas, who served under Alexander the great. He wrote a work on machines. 5. 29.

POLIDO (PEDRO), of Toledo, with Juan de Guas of Segovia, contracted 1472 to complete the erection of the capilla mayor of the convent of El Parral at Segovia, within three years. 66.

POLIDORO (ERCOLE), a pupil of J. Oldovino, was engaged principally on churches and monasteries. For Bianca Maria Visconti, countess of Cremona, wife of Fr. Sforza, duke of Milan, he constructed two large monasteries at Cremona; one, that of Corpus Domini with a small church in 1455: the other of Sta. Monica for the Augustinians, with a large church (Gothic), which 1824 was used as a military warehouse. 57.

POLING BOARD or POLINGS. The small board, lath, or batten, laid across the ribs of centering in forming a vault. TUNNEL.

POLISH. The finished surface, gloss, or lustre, given to various substances, as glass, metal, wood, marble, etc., to bring out their natural beauties. It is effected by various operations. Enamelling, glazing, bronzing, lacquering, are all species of polishing. The method of giving the high polish to works in *granite* seen in Egypt, and Hindostan even at the present day, is described by KENNEDY, in EDINBURGH PHIL. JOURNAL, 1822, iv, 349; reprinted in LIBRARY OF USEFUL KNOWLEDGE, *Egyptian Antiquities*, 8vo, London, 1832, i, 206, 310; ii, 333. NEWBOLD, *Processes—for Quarrying and Polishing*, in ROYAL ASIATIC SOCIETY *Journal*, vii, 113-28. The polishing of granite in England at the present day, is by rubbing with an iron tool, and with sand and water; then emery is applied, then putty with flannel: all plain surfaces and mouldings can be done with the aid of machinery, but carvings and broken surfaces must be hand-worked; CIVIL ENGINEER, ETC., *Journal*, 1866, xxix, 177. GRANITE (p. 72-4).

Polishing to *marble* is noticed s. v.; and in URE, *Dict. of Arts*, etc. Some marbles receive a rich colour as well as polish by friction with hot beeswax, or a mixture of wax and turpentine. In England, marble is polished by grinding and forming the surface by means of wet friction, which lasts with care for a generation or more. In Belgium, the marble is dry rubbed, a quick process, but one destroying the hard surface of the marble; the glossy operation is then performed by pouring on the marble some such chemical as spirits of salt. This is so strong, it produces a hissing noise, and softens the surface, and then a slight rubbing is given which gives the polish; but there

is a peculiar deadness about it, and in the course of a few years it disappears and requires reviving. This chemical wash is the English mode of polishing carved work; the marble is tooled and perhaps sanded, and then washed with salts; it looks dead, soils in a year or two, but can be revived with potash or chloride of lime; PARSLOW, in BUILDING NEWS *Journal*, 1870, xix, 28.

Polished *stone* is mentioned, *cir.* 674, as used at Ripon and Hexham, but it may have meant a well-dressed surface. In 1780, steps of Craigleith stone were directed to be "brotched, droved, and polished". Polishing by machinery, executed under Adams's patent, is said to work a load of freestone from a quarry face to a finely polished surface, in from 10 to 20 minutes; and granites and marbles in about one-third the time taken by the usual machines; BUILDING NEWS *Journal*, 1873, xxiv, 699. In France, ordinary limestone has lately been "French polished" for decorative purposes, and gives a very agreeable warm brown tint, with a good polish: it has also been successfully applied to Portland stone.

Polished Berlin *iron*, of ornaments, is obtained by the use of crocus on a buff wheel; it is not easily tarnished.

Woods are polished in several ways. 1. Oil polish; sizing, rubbing down with glass paper, and then linseed oil applied. 2. French polish, a laborious operation. Deal is well sized, rubbed down with glass paper, and polished. Mahogany, walnut, and wainscot, are first sand papered, the pores filled up with prepared Russian tallow, and then French polish well and carefully rubbed in, at two or more operations. Hard woods may be rapidly polished in a lathe. BARNABY, in BUILDING NEWS *Journal*, 1871, xxi, 99. 3. Wax polish. 4. Half polish, finished at once with French polish. 5. Using a polish like a varnish applied with a brush, such as Norminton's "English polish", 1862.

The carver, after cleaning with sand paper of different qualities, or by pumice stone, gives various sorts of polish to his work. A. F. B., *Designs for wood carving; with practical instructions in the Art*, fol., London, 1867: and BUILDING NEWS *Journal*, 1868, xv, 8.

Floors of wainscot are polished, by prepared bees wax well rubbed in, with rubbers as to stone to landings, and other floors by first painting with mineral paints, and then with lac polish. These must never be washed with soapy water. Same *Journal*, 1872, xxiii, 150.

Enamelling and polishing paint on woodwork, is described in SUTHERLAND, *Art of House Decoration*, 1869; reprinted in same *Journal*, xvi, 393. PAINTER'S WORK.

POLISH HUT, or RUSTIC HUT. (Fr. *maison rustique;* Ger. *ländlicheshaus*). A hut erected in garden decoration and formed of log framing or unbarked timber, and brick or stone walls; perhaps first employed by Kleber (afterwards the general) in the grounds of marquis de Florimont, in Alsace. KRAFFT, *Plus beaux jardins pitt.*, fol., Paris, 1809, i, pl. 42-44; 83; 85. ACKERMANN, *Repository of Arts*, 1819, vii, 249; and in PAPWORTH, *Ornamental Gardening*, 8vo., 1822, p. 78, pl. 12. HUT.

POLLACK, sometimes written Pollak and Pallach (LEOPOLDO) of Vienna, succeeded 18 May 1803 in the works at the cathedral at Milan, in which city he began 1760 or 1790 the new palace, continued by Vanvitelli with G. Piermarini, and others (CASSINA); designed 1790-93 the villa reale, formerly palazzo or villa Belgiojoso (CASSINA); and the filo drammatico, assisted by L. Canonica. Died 13 March 1806.

His son GIUSEPPE was appointed 15 April 1806 assistant architect at the cathedral, being probably succeeded by P. Pestagalli in 1813.

POLLAJUOLO (ANTONIO), chiefly a sculptor and painter, born 1433 at Florence, designed about 1490 for pope Innocent VIII, the villa called the Belvedere, a short distance from the Vatican palace, but it was erected by others; the tombs of pope Innocent VIII (d. 1492) and of Sixtus IV (d. 1484) in bronze. He died 1498, or, according to the epitaph in the church of S. Pietro in Vincoli, in M.IID, aged 72 years. Andrea Contucci, called "il Sansovino", was a pupil. 73.

POLLAJUOLO (SIMONE), of Florence; or as in his will, "Simon Masi, architector ac sculptor excellentissimus", as cited in GAYE. Born 1454, at an early age he visited his relative Ant. Pollajuolo at Rome, where he so well studied the relics, that returning and continually speaking of them he obtained the name of IL CRONACA. He continued the palazzo Strozzi, designed 1489 by B. da Majano (died 1498), designing the decorations; the Corinthian entablature (CROWN CORNICE) on the outer side enlarged from one at Spoglia di Christo at Rome; adorned the cortile with the two orders, and the decorations; the cressets at the angles and the *campanelloni* at distances along the walls, (executed by N. Grosso Caparra, a smith of Florence) *Illustrations*, s. v. Metal work, 1848-49; GRANDJEAN AND FAMIN, *Arch. Toscane*, fol., Paris, 1846, pl. 15-8, which also gives, pl. 29, the palazzo Guadagni, attributed to him by FANTOZZI, but to F. Brunellesco by them, from its great resemblance to the palazzo Nicolini. He designed the octagonal sacristy of Sto. Spirito at Florence after an ancient temple (GRANDJEAN, pl. 75): the Franciscan church of S. Salvatore del Monte, or S. Francesco dell' Osservanza on the hill of S. Miniato outside the city, called by Buonarroti "la sua bella villanella": and the monastery of the Servite fathers, of which little more than the first, or del Pozzo, cloister, remains of his work (GRANDJEAN, pl. 66) and was architect to the duomo. With B. d'Agnolo he 1494 made extensive alterations in the council hall of the signoria in the palazzo Vecchio, with its staircase; this room is 176ft. by 72 ft. (or 172 ft. 6 ins. by 73 ft., FANTOZZI; GRANDJEAN, pl. 37, gives the size as 153 ft. 6 by 64 ft. by 61 ft.), and was about 32 ft. high; the timber roof consisting of king and queen posts was arranged with much care, and was frequently copied by different artists to be sent into distant parts (VASARI; who raised the walls about 23 ft. higher, making the hall 62 ft. (FANTOZZI), and put on a new roof). Simone laid out for Cosmo I, the giardini dei Boboli, also said to be planned 1550 by Niccolo called il Tribolo, and designed the casino; the gardens were continued by Buontalenti. With A. Giamberti and B. d'Agnolo respectively, he moved the statues, as noticed s. v. Giamberti. He died before Sept. 1508 (GAYE) at Florence, and was buried in S. Ambrogio; the epitaph is given in VASARI; and Q. DE QUINCY, *Vies*, 8vo., Paris, 1830, i, 97, who gives the elevation of the palace. LAPI (p. 23). GAYE, *Carteggio*, 8vo., Flor., 1840, ii, 480-3. 3. 25. 30. 73.

POLLANARRUA, or Pollonarua, or Pulastipura, now called Topawoewa, Topawa, or Toparé. A ruined city, the principal one in Ceylon, which A.D. 768 succeeded to Anuradhapoora as the capital, and was deserted 1235. The greater part of the remains seem to have been erected during the reign of Prakrama Bahu, 1153-86. In the centre of the place is the great circular Rankot dagoba, a solid domical mass of stuccoed brickwork, surmounted by a gilded spire and umbrella. Beyond it is a smaller but similar Kiri dagoba; and further on is the royal palace, or Jayta Wana Rama temple, having an erect statue of Buddha 58 ft. high. Close to the further gate is the Gal vihara, a rock temple with a sitting figure of Buddha 16 ft. high; another is 25 ft. high, and a third, prostrate, is 45 ft. long.

The Sat Mehal prasada is a six-storey temple. In front of it is a dolmen 26 ft. long 4 ft. wide and 2 ft. thick, the edge carved; and near it a peculiar hollow dagoba or shrine, with its procession-path and pillars and flights of steps, also several groups of pillars without roofs or walls, and other ruins. MONOLITH. PAGAHM in Burmah. Descriptions of the ruins differ in the following books: FORBES, *Eleven Years in Ceylon*, 8vo., 1840, i, 391, 410; TENNENT, *Christianity in Ceylon*, 1850, and his *Ceylon*, 3rd edit., 8vo., 1859; BAKER, *Eight Years in Ceylon*, 8vo., 1855, new edit., 1874; RHYS DAVIDS, in ROYAL ASIATIC SOCIETY, *Journal*, new series, vii, 156; FERGUSSON, *Indian Arch.*, 8vo., London, 1876, p. 199-204.

POLLARD. A tree which has had its top repeatedly cut off. The woods of the tops of pollard trees, such as the red oak, elm,

ash, etc., when cut, owe their beauty to a crowding together of the little germs, whence originate the numerous shoots, which proceed from them after they have been lopped off. The burrs or excrescences of the yews and some other trees appear to arise from a similar cause, and are sometimes of immense size, so as to yield a large and thick slab of highly ornamental wood of most confused and irregular growth. HOLTZAPFFEL, *Cat. of Woods*, 8vo., London, 1843, p. 34. CURL. GRAIN. 14.

POLLENTIUM (POLLENZA). A city of Liguria, in Italy. Considerable remains of the ancient city may be traced, including theatre, amphitheatre, temple, and other buildings, with various inscriptions. MILLIN, *Voyage en Piemont*, etc., ii, 55. 23. 28.

POLLET (JEAN); see POLET (J).

POLLET (J.....), of Lyon, where he designed the tower or observatory (CHAPUY, *France Mont.*, fol., Paris, 1842, etc., pl. 43). With Chenavard, he rebuilt 1829-31 the theatre designed by J. G. Soufflot; also the smaller theatre, given in pl. 34, of POLLET AND ROUX, *Mons. d'Arch.—à Lyon*, fol., Paris, 1841; which also contains the following works by him:—Restoration of the ancient church of Ainay (pl. 1-4); 1825, design for l'église des Brotteaux (pl. 25); 1825, église de Ferney (pl. 39-40); 1826, erected the church de la Madeleine de Tarare (pl. 25, 36, and 40); 1826, the chapelle à Champvert-les-roses (pl. 23-4); 1834-6, church of S. Martin des Fontaines (pl. 26-7); with smaller works and other details. Pollet died before 1841.

POLLET (JUSTE), with two other architects of Antwerp and Malines, overthrew the work of J. Stassius 1481-1527 at the hôtel de ville at Gand. 97.

POLLEYT (EUSTACHE), of Antwerp, designed 1527-63 the turret at the angle with part adjoining, at the hôtel de ville at Gand; SCHAYES, *Hist. de l'Arch.*, 8vo., Brux. (1850-53), p. 44; and STAPPAERTS, *Belgique Mont.*, 8vo., Brux., 1844, i, 54, who gives the dates 1481-1580 with a view. WEALE, *Handbook to Belgium*, 8vo., London, 1859, p. 183, does not mention him. GAND. KELDERMANS.

POLLING-BOOTH; see HUSTINGS.

POLLIO; see C. POSTUMIUS POLLIO; and M. VITRUVIUS POLLIO.

POLLIS. According to VITRUVIUS, vii, pref., wrote a treatise on the *Rules of Symmetry*.

POLLIX. A thumb, or inch, in measure of length, as stated in the statute cited s.v. FOOT and PERCH.

POLMAISE SYSTEM OF WARMING. The air is sucked down from the floor above to the heating chamber, there warmed, and then ascends into the building, as stated in BUILDER *Journal*, 1846, iv, 603. J. M. TAYLOR, in ENGLISH MECHANIC *Journal*, Nov. 8, 1872, describes it, with woodcuts; also given in BUILDING NEWS *Journal*, 1873, xxiv, 179.

POLONCEAU (ANTOINE REMI), born 7 Nov. 1778 at Rheims, became inspecteur des ponts et chaussées at Paris. He executed for Napoleon the works of the several routes across the Alps; and 1806 transported the blocks of marble to the top of mont S. Bernard, for the tomb of general Desaix in that church; MAGASIN PITTORESQUE, 1844. He invented a new system for cast-iron bridges, the ribs being tubular filled in with laminated timber, the piers of concrete cased with stone, such as that of Erdre at Nantes, and the Carrousel at Paris, 1834-36; ALLGEMEINE BAUZEITUNG, ser. i, pl. 657, ser. ii, pl. 152; CIVIL ENGINEER, etc., *Journal*, 1839, ii, 79-82; iv, 92; v, 227; DALY, *Revue Générale*, vii, 96; viii, 451, by his son; and described in his *Notice sur le nouveau système de Ponts en fonte*, etc., 4to. and fol., Paris, 1839. He published many works on hydraulics and roads, and *Des Bitumes et de leurs divers emplois*, in DALY, *Revue Générale*, 1840, pp. 43, 91, 162, 266; 1841, ii, 411, 516. He died 30 Dec. 1847 at Roche (Doubs). HÉRICART DU THURY, *Notice Biog.*, in ANNALES DE L'AGRICULTURE FRANÇAISE, March 1848, p. 276.

His son, JEAN BARTHÉLEMY CAMILLE POLONCEAU, ingénieur des ponts et chaussées, was born 29 Oct. 1813, and died 21 Sept. 1859, near Paris. PERDONNET, *C. P. Notice Biog.* MORISOT, *La Propriété Journal*, 8vo. and 4to., Paris, 1833, ii, 98, pl. 24. 112. 113.

POLTAVA, or PULTAVA, called STAVA in XII cent. The capital of the government of the same name in European Russia, near the confluence of the rivers Poltava and Vorskla. It was destroyed by the Tatars early in XIII cent. It is built chiefly of timber. The cathedral in the old town, about a mile distant, was built 1770; a church 1707; and there are eleven other churches. The new town was erected 1608. There are three memorials to Peter the Great, dating 1809 and 1849; and about 4 miles distant is a mound with a memorial marking the site of the battle 1709 where Peter defeated Charles XII of Sweden. 14. 50. 28.

POLTEN, or SAINT PÖLTEN, a contraction of S. Hippolytus. A town situated on the left bank of the river Trasen, in Lower Austria. It is the see of a bishop. The cathedral and parish church dedicated to S . . . . , has a tomb to bishop Kerenz by Vischer. There are also two churches; a fine episcopal palace; palaces of prince of Auersperg, and of count Rindsmaul; a rath haus; burgher hospital and infirmary; and the *Kreisamt* or courts and public offices. The Trinity column finished 1782, is 63 Vien. ft. high. STROHMAYR, *Topog. der If. Stadt St. P.*, 8vo., Vienna, 1813; BLUMENBACH, *Topog. skizze von S. P.*, in "Den Vaterländischen Blättern", 1813, Nos. 7 and 8. 26. 28. 50.

POLTESCO MARBLE. It was said 1870 to be the only marble that retained its polish in exterior work.

POLYANDRION. A class of tombs, so called by the Greeks—such as were dedicated to the memory of those slain in battle for their country. The 'Lion' tomb at Cnidus has a central chamber out of which openings radiate, as described by NEWTON, *Discoveries in the Levant*, ii, 224, who mentions the Hellenic tombs at Budrum, and at Pyli in the island of Cos. The remains of the circular tomb, 50 ft. diameter, discovered by J. T. Wood at Ephesus, having a solid centre with a passage around it from which chambers are formed, is considered to be of this class; it stands in an enclosure over 150 ft. square surrounded by a colonnade; SOCIETY OF BIBLICAL ARCHÆOLOGY, *Transactions*, 1879, vi, 324; 329; and vii, etc.

POLYCHROMATICON OPUS; see POLYCHROMY.

POLYCHROMY. A modern word compounded from the Greek, denoting the employment of colours; Von Klenze, 1837, used the word LITHOCHROME in his first example; as stated s. v. Munich, in PENNY CYCLOPÆDIA, p. 485.

POLYCHROMY. The art and practice of painting as employed to buildings, either on flat or sculptured surfaces; and also to statues. The various methods of wall painting are described s. v. DISTEMPER; ENCAUSTIC; FRESCO. 1. 14.

Besides the publications on polychromatic *ornament* given s. v. ORNAMENT, are DE BASTARD, *Peintures et Ornemens des Manuscrits Français, depuis le VIIIme siècle, jusqu'à la fin du XVImc*, fol., Paris, 1835-46. WILLEMIN AND POTIER, *Monumens inédits Français—depuis le VIme jusqu'au XVIIme siècle*, fol., Paris, 1825-39. PRESUHN, *Die schonsten wände Pompejis*, 4to., Turin, 1877, etc., Eng., Fr., and Ger. text.

Egyptian polychromy. MINUTOLI, *Reise*, Berlin, 1824, pl. 14, gives Hermopolis magna. LEPSIUS, *Denkmaeler aus Ægypten, etc.*, 12 vols., fol., Berlin, 1849-59.

Greek and Roman. KUGLER, *Ueber die Poly.*, etc., 4to., 1835; and its review by HAMILTON, *On the Polychromy*, etc., in Royal Institute of British Architects, *Transactions*, 4to., 1836, which, p. 99, and in table of contents, gives a *list of writers* on the subject. Also *Report on the Elgin Marbles*, 1837; *Report on Marbles from Xanthus*, 1843; and DONALDSON, Explanation of HITTORFF, *Restitution du Temple d'Empédocle à Selinonte, ou l'arch. poly. chez les Grecs*, fol., Paris, 1851, with *discussion*, Jany. 12 and 26, 1852. LÉTRONNE, *Lettres d'un Antiquaire sur l'emploi de la peinture hist. murale dans la décoration des temples*, etc., 8vo., Paris, 1836. RAOUL-ROCHETTE, *Peintures Antiques inédites, précédées de recherches sur l'emploi de la Peinture dans la décoration des Edifices sacrés et publiques, Grecs et Romains*,

4to., 1836; also his *Lettres Archéologiques, sur la peinture des Grecs*, 8vo., 1840. Foreign Quarterly Review, 8vo., London, 1836, No. 35, Art. viii. Semper, *Ueber polychromie und ihren ursprung*, 8vo., Brauns., 1851. The articles on polychromy by Hittorff and Semper, in Falkener, *Museum of Classical Antiquities*, 8vo., London, 1851-2, p. 20, 228; and by Beulé, *La Polychromie*, in Daly, *Revue Générale*, 1858, xvi, 193—211. Jones, *Apology for the Colouring of the Greek Court at the Crystal Palace*, 12mo., London, 1854. Pompeii. Baths.

Greek painting to statues. Leake, *Athens*, 8vo., London, 1821, p. 399; and Athenæum *Journal*, for May 1839, describing a statue in alto-relievo found by K. S. Pittakys; and in Civil Engineer, etc., *Journal*, ii, 220. Westmacott, *Polychromy in Sculpture, or Colouring Statues*, read at Society of Arts, 1859; Builder *Journal*, xvii, 170; and review in Building News *Journal*, p. 279. Scharf, *On the Polychromy of Sculpture*, in Falkener, *Museum*, etc., 247.

Gravina, *Il Duomo di Monreale*, fol., Pal., 1860; and other books on Moorish, etc., polychromy, named s.v. Ornament. Wyatt, *Observations on poly. decor. in Italy from XII to XVI* cent., in R. I. Brit. Archts., *Sessional Papers*, 1850-51. Waring, *Arts connected with Arch. in Central Italy*, fol., London, 1858; and *Arts connected with Architecture in Tuscany*, R. I. Brit. Archts., *Sessional Papers*, 1857-58; Gruner, *Fresco decorations XV and XVI cent.*, fol., London, 1840; and text, 4to., by Hittorff. Koehler, *Polychrome Meisterwerke der Monumentalen Kunst in Italien*, vom V bis XVI Jahr., 12 pl., large fol., Leipzic, 1870-77, giving examples from Ravenna, Florence, Palermo, Orvieto, Rome, Siena, Genoa, and Venice. The paintings in the Vatican by Raffaello. Rouyer et Darcel, *L'Art Architectural en France*, 4to., Paris, 1866. Waring and Wyatt, *Handbooks* to the Byzantine, Italian, Mediæval, and Renaissance Courts at the Crystal Palace, 8vo., London, 1854.

Mediæval polychromy, cited s. v. Ornament; and Waller, *Hist. Account of Painting as formerly used in Churches*, Builder *Journal*, 1846, iv, 391. Blackburne, *Decorative painting applied to English Architecture*, 4to., 1847. Smith, *Antiq. of Westminster*, 4to., 1807-9. Brayley and Britton, *Palace of Westminster*, 8vo., 1836. Emeric David, *Hist. de la Peinture au Moyen Age*, etc., 8vo., 1842; 1852. Lacroix, *Les Arts au Moyen Age et la Renaissance*, 8vo., 1869; 1871. Labarte, *Hist. des Arts Industriel au Moyen Age*, 4to., 1864-66. Gailhabaud, *L'Arch. du V siècle*, etc., 4to., Paris, 1854, *passim*. Serè, *Ornaments of the Middle Ages and Renaissance*, 4to., Paris, 1851; *How to colour a church*, in Builder *Journal*, 1868; and in Church Builder *Journal*, 1868, p. 172.

Wilkinson, *On Colour, and on the necessity of a general diffusion of taste*, etc., 8vo., London, 1858; reviewed Builder *Journal*, xvii, 33. Smirke, *Colour as applied to Architecture*, in Civil Engineer, etc., *Journal*, 1861, xxiv, 65, 93.

POLYCHROMY; Natural; or use of coloured materials. Two modes treated in Italy are—1, that practised at Venice; the veneering of brick walls with thin layers or coats of marble; 2, that practised at Bergamo, Cremona, and Como; the verde di Prato used at Prato Cathedral, at Florence, Pisa, Pistoia, etc., and in Sardinia; in which the marble or coloured stone formed portion of the substance of the wall. These two modes led, as would naturally be expected, to two entirely different styles and modes of architecture. These are explained in detail in Street, *Brick and Marble*, etc., 8vo., London, 1855 (pp. 273, 278, etc.); and copied in Builder *Journal*, xiii, 377-8; which 419 gives *Colour in Bricks*. Building News *Journal*, *Stones in Colours*, 1879, xxxvi, 464. Batissier, *Hist. de l'Art*, 8vo., Paris, 1845 and 1869, pp. 47, 179, 557. Ramée, *Hist. de l'Arch.*, 8vo., Paris, 1843, i, 435; ii, 173-7, referring to brick and terra-cotta with stone-work. Flint-work with stone, as in some Norfolk and Suffolk churches. Colour imparted to the material of which bricks are made, as in a dove cote near Rouen, xvi cent.; and the château de Louey near Dreux; Rouyer et Darcel, *L'Art. Arch. en France*, 4to., 1866, ii, 4.

POLYCLETES, Polyclitus or Polycleitus, of Argos, flourished about B.C. 430, and was the rival of Phidias. He built a tholos about 20 ft. diam. in the hieron of Æsculapius at Epidaurus; and a theatre for 12,000 spectators, which is in good preservation; this last is illustrated by Donaldson, Supp. vol. to Stuart, *Antiq. of Athens*, fol., London, 1830. Pausanias, ii, 27, considered that for elegance and symmetry it surpassed even those of Rome. He speaks, vi, 6, of two artists of this name of about the same period and country; the difficulties attending his statements are discussed in Sillig, *Dict. of Artists*, 8vo., Lond., 1836. He wrote a treatise *On the Symmetry of the Members of the Human Body*, and had many pupils. 3. 14. 25. 59.

POLYCRITUS I. A fabulous architect, respecting whom an absurd tale is related in Pseudo Plut. *Quæst. Gr.*, 37, T. vii, p. 196, R. Sillig, *Artists*, 1836. 3.

POLYFOILS, or Multifoils (Fr. *polylobes*). An ornament formed by a moulding disposed in a number of segments of circles. A niche in the west gable at Wells cathedral has ten foliations or featherings. 19.

POLYGON. A figure having three or more sides. Given the radius of a circle to find the side of any regular polygon (sides not exceeding 12) inscribed in it; multiply the given radius by the number in the column entitled *factors for sides*, standing opposite the number of the proposed polygon; the product is the side required. Thus, suppose the radius of the circle to be divided into 5 parts, then $5 \times 1{\cdot}732051 = 8{\cdot}66025$, will be the side of the inscribed equilateral triangle.

No. of sides	Table of Polygons	Multipliers for circum.	Radius of circum. cir.	Factors for sides.
3	Trigon	0.4330127	0.5773503	1.732051
4	Tetragon, or Square ..	1.0000000	0.7071068	1.414214
5	Pentagon	1.7204774	0.8506508	1.175570
6	Hexagon	2.5980762	1.0000000	1.000000
7	Heptagon	3.6339124	1.1523824	0.867767
8	Octagon...	4.8284271	1.3065628	0.765367
9	Nonagon	6.1818242	1.4619022	0.684040
10	Decagon	7.6942088	1.6180340	0.618034
11	Undecagon	9.3656399	1.7747324	0.563465
12	Dodecagon	11.1961524	1.9318517	0.517638

Another rule, "given the diameter to find the length of a side", is described by Tarn, in the Builder *Journal*, 1861, xix, 631. Serlio, *Archit.*, fol. Ven., 1663, pp. 25-6 for a pentagon, hexagon, octagon, and nonagon. Gwilt, *Encyc.*, edit. 1876, p. 330.

POLYGON. A name given to a space so formed, as that in the Forest at Versailles.

POLYGONAL APSE; see Apse.

POLYGONAL MASONRY (*opus cyclopum: opus polygonum*). The species of building with stones of large size, and of four varieties, as described s.v. Cyclopean masonry, and employed by the ancient inhabitants of Greece, Italy, Asia Minor, etc. Dennis, *Etruria*, ii, 282, refers this work to the Pelasgi, whence it is also called Pelasgic masonry, as remains of such work is found in *almost* every land which it is said they occupied. They were subdued in Italy by a race called Tyrrheni by the Greeks, and Etrusci by the Romans, about fifty years before the Trojan war, and in the time of Tarquinius Priscus the whole race appears to have disappeared as one of the leading nations of Italy; *Handbook*. The Dryopas tribe (Dryopic) was a branch of the great Pelasgic family expelled from its ancient seat in Thessaly. The term lesbian walling refers to that phase of walling which showed a trapeizoidal network of joints on the face of the work, mentioned in Aristotle, *Ethica*, v, 10; and this passage intimates the comparatively late period at which such work might have been executed at Athens, Cnidos, Mycenæ, Rhamnus, and Thoricus, as well as at Aperlæ, in Lycia, where a bath decides in the most peremptory manner, according to Texier, *Asie Mineure*, fol., Paris, 1839, iii, pl. 206-9, many questions as to the mode of construction called Pelasgic; it is in perfect preservation, no mortar was used, and was built in honour of the emperor Titus (79-81). The remains at Cnidos, a city of Caria, also show that a similiar construction was in use in Asia even

under the Roman dominion; TEXIER, iii, p. 171, pl. 159-164. Capt. Soitoux, of the French commission, found in the wild ravines of Acarnania more than thirty foundations of towns of this construction. In Arcadia polygonal walls are constantly being found; in a valley between the lake Stymphalus and the mount Trachys of Orchomenus, prof. Rangabe discovered 1848 the town of Halia (PAUSANIAS. viii, 23), at least two-thirds of which are in a good state of preservation: RANGABE, *Recent Discoveries*, read at British Association, Aug. 1850, at Edinburgh; printed in ARCHITECT, ETC., *Journal*, ii, 400. Polygonal walling, says FELLOWS, *Asia Minor*, 320 and *passim*, is later than the regular: older, or at least, *ruder than that at Tiryns*, exists at Ephyra, afterwards called Cichyrus; HUGHES, *Travels*, ii, 440.

The first important constructions in *Greece* appear to have been the polygonal walling to cities, and though the early date given to the gate of the Lions at Mycenæ be not accepted, most architects will agree with FERGUSSON, *Ill. Handbook*, 8vo., Lond., 1855, i, 258, that such sculpture exhibits a purely Asiatic form of art. "*Five* remarkable specimens of polygonal work exist; as in the remains of the ancient cities of Leucas in Santa Maura (anciently Leucadia), of Samos, and Cranea in Cephalonia; and the buildings called the castle of Ulysses, and the school of Homer, in Ithaca"; ANSTED, *Cyclopean Arch. in the Ionian Islands*, etc., in ART JOURNAL, 1864, iii, new ser., 33-5. Others at Argos and Lycosura, B.C. 1820; Pterium or Tavium, in Asia Minor; Tiryns (1); Argos; Mycenæ (1, 2, 3, 4); Methana (1); Aperlæ; Megara; Delphi (1-3); temple in Epirus (2); Orchomenos (1); gateway at Ephesus; gate at Thoricus (4) in Attica; at Assos; a roof formed by two arch stones at Delos; a doorway at Missolonghi; tunnels cut through mount Ptoön in Bœotia; Halia; Chæroneia (3); Thoricus (3); Messaloggion (3); Gallaxida (3); cella walls of temple at Rhamnus (2); Lilai (3); Pharsalia (3); Messene (4); Cnidos ( ); Daulia (2); Gortys (2); Eleutheræ (4); Phylæ (4); and pnyx at Athens (3). ETRUSCAN. GREEK MASONRY. OSCAN. IRISH ARCHITECTURE. ITALIAN ARCHITECTURE. PELASGI. PERSEPOLIS. PSEUDISODOMUM; ISODOMUM; INCERTUM. PERGE.

Throughout *Italy* are found at least 300 constructions of polygonal walling called cyclopean and Pelasgic work. Etruscan work is always parallelogram without cement, except at Cosa, which was of Pelasgic origin. The vestiges of the ancient citadel at Alatri, show some of the best specimens of the Pelasgic manner of building—the accuracy with which such enormous masses were fitted.

The form of the masses employed in these constructions varies with the nature of the stone employed. When *sandstone* was used, as at Cortona and Fæsulæ, the form of the blocks has been parallelopipedal or nearly so: when *limestone* was the material, as at Alatri, Cosa, Rosella, Segni, Tarentino, etc., the polygonal construction is alone seen: and the same observation will be found to apply to every part of the world, and in a marked degree to the cyclopean constructions of the Peruvians; *Handbook*, North Italy, 590. The Roman kings imitated the polygonal style, when hard stone was unfavourable to the parallelogram of Etruscan work. At Palestrina are exhibited the polygonal masses; the smaller polygonal work of a later period when the Pelasgic style was imitated in those districts where limestone was used; as well as later work. MOMMSEN argued that the greater number of the mural structures styled cyclopean in Latium, Sabina, and Etruria, are not older than VIIth cent. of Rome (A.D. 14), and to be regarded as restorations effected under her rule. Pelasgic towns, in Italy, *temp.* Tarchion, presenting such work are Agylla (Regulini Galassi tomb), Alsium, Pisa, Falerium, Saturnia, and Fescenninum (Civita Castellana), besides Tarquinium and Cortona. In the neighbourhood of Rome the most striking examples are at Alatri (1, 2); Cora (1); Segni (1, 2); Norba (1, 2); Civitella, Ferentinum (2, 3); Vicovaro; Præneste (2); and Volterra (4). Others at Acquicola, Alba, Ameriola, Anagni, Arpinum Amiternum, Atalis, Atina, Bononia; Cære, Coenina, Cosa (1, 2), Empulum, Fiesole (3), Gabii, Medullia, Œsium, Orbetello, Populonia (3), Pyrgos, Spina, Terracina (3), Todi (4), Tusculum, Verulæ, Vitriano (3), etc.

Besides these polygonal works in Europe and Asia, there are others in Mexico, and Peru, as at CUZCO; TSCHUDI, *Peru*, 8vo., London, 1847, p. 233, 298, 300, 306. SQUIER, *Peru*, 8vo, New York, 1877.

EURIPIDES; APOLLODORUS; STRABO; SENECA; STATIUS; and PAUSANIAS, who describes this masonry carefully; also PLINY; while THUCYDIDES describes it as employed to fortify the Piræus, of which scarce a trace remains.

Pompeii, by Society for Diff. of Useful Knowledge, 1831, i, 58-64; and enlargement by DYER, 8vo, Lond., 1868, 2nd edit. DUBOIS DE MONTPEREUX, *Voyage autour de Caucase*, fol., Paris, 1839-43; Index, s. v. Cyclopiques. TEXIER, *Asie Mineure*, fol., Paris, 1839-49; Cnidus, iii, pl. 159-62; at Aperlæ, now Cacamo, he found voussoirs of Pelasgic work. FLANDIN ET COSTE, *Voyage en Perse*, fol. Paris, 1844, p. 68; 166. DODWELL, *Cyclopean and Pelasgic remains in Greece and Italy*, fol., 1819; and *Views*, 1834. HUGHES, *Travels in Greece, Sicily*, 8vo., London, 1830; WALPOLE, *Memoirs*, 315. TOD, *Rajasthan*, 4to., London, 1829, i, 725. RAMÉE, *Hist. de l'Arch.*, i, 342. DENNIS, *Etruria*, 8vo., London, 1848; 1879, 2nd edit. Bunbury, in CLASSICAL MUSEUM, ii. GELL, *Ithaca and Argolis*: and his *Topography of Rome and its Vicinity*, 8vo, London, 1846. HAMILTON, in ARCHÆOLOGIA, xv, 320. CLARKE, *Travels*, 4to., 1810-23. PETIT RADEL, *Mons. Cyclopéens*, 1841, referred to by PARKER, *Walls of Rome*, 8vo., London, 1874, p. 11, describing *P. M.; called also Cycl. Phœn. and Pelasgic*. ARCHITECT *Journal*, 1850, ii, 192. CIVIL ENGINEER, ETC., *Journal*, xiii, 109, 289. BUILDER *Journal*, *On the walls of Greece and the rock walls of Schleswig Holstein*, 1853, xi, 276, 306. SCHLIEMANN, *Mycenæ*, etc., 8vo, London, 1878.

POLYGONUM OPUS; see POLYGONAL WALLING.

POLYPHANT STONE. A stone of a green colour obtained from Lewannick, near Launceston in Cornwall.

POLZEVERA, POLCHEVERRA, or POLCEVERA MARBLE; also called vert d'Egypte, vert de mer, and verde di mare. A sombre mixture of granular limestone with a talcose and serpentine substance disposed in veins, sometimes mixed with a reddish body, obtained in the valley of the same name near Genoa. It was formerly much used for chimney pieces in France, Italy, and England: some columns in the church of S. Sulpice at Paris are examples of it. The red granite of Polzevera is very fine and cheap. In the cathedral at Genoa are columns of Polzevera and white marble in courses. 28. 107.

Polzevera breccia, also called verde di Suza, green and white, is obtained near Genoa; it resembles breccia verde antica; another sort is white and red, and is obtained from the quarries of Pignone and Rochetta, canton of Villa-franca, in the Apennines.

POMEGRANATE. This fruit, "described by PAUSANIAS as in the hand of Juno at Mycenæ, was typical of some of the mysteries of the Greeks; the alternating bell is said to have been used by the Pelasgians at Dodona, and also to the tomb of Porsenna, king of the Etrurians"; INWOOD, *Erechtheion*, fol., London, 1827, p. 17. "The female statues, as at Volterra, that hold tablets in one hand, generally hold a pomegranate, the emblem of fertility, in the other, to intimate that the grand duties of women were not to be neglected"; DENNIS, *Etruria*, 8vo., London, 1848, ii, 171; 336. It was deemed amongst all ancient nations an exceedingly mysterious and sacred emblem; the POPPY in some countries appears to have been substituted for it; the two were carried in the mysteries of Demeter and Ceres at Eleusis, etc. STUART, *Antiq. of Athens*, fol., London, 1830, p. 14 of Grecian ornament.

The pomegranate or BALL-FLOWER, was a decoration used, it is stated by PARKER, *Handbook to Oxford*, in honour of queen Eleanor of Castile, mother of king Edward II; it occurs in the panels and gables of the pinnacles to the spire of S. Mary's church, Oxford, at which period it was erected by her almoner. It was used in England, *temp.* Edward I, and long before in the

English provinces in France; Builder *Journal*, 1860, xviii, 187. Wigley, in Institute of British Architects, *Sessional Papers*, 1855-56, p. 105, considers the red anemone of the Holy Land, the lily of the Scriptures, as evidently the type of the ball flower. It was a very characteristic ornament of the Decorated period of the xiv cent. A rude ball ornament, constantly seen in work of the xv cent., occurs in the windows of the chapel of the cloisters at Avila cathedral; Street, *Spain*, p. 169.

POMEL. A globular protuberance as a boss or knob, terminating a pinnacle, a spire, etc. A new "pomellū", 1278, was placed upon the great hall of Westminster, and whitewashed; two new "pomell'" of the two great kitchens and covered with lead; also six new wooden "pomell" for the king's seat in the little hall: and 1352 repairing the pomells and finials of the tabernacles in S. Stephen's chapel £5 0s. 6d.; occur in Brayley and Britton, *Palace*, 8vo., London, 1836, p. 80; 167. 16. 19.

POMERANIAN brickwork; Building News *Journal*, 1873, xxv, 577; xxviii, 8; 120.

POMIERS: Saint; see Pamiers, in France. Lyon.

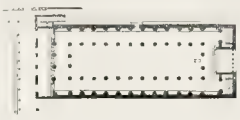
POMŒRIUM. A templum, or locus liberatus et effatus by the augurs, in which auspices could be taken, but not necessarily consecrated by the priests; Burgess, *Rome*, 8vo., London, 1831, i, 273-6. Ædes. It was a line, or symbolical wall, running by the walls of a town; it was a consecrated space, marked by stone pillars, either within or without the real wall, and could neither be built upon nor be tilled (Livy). At Rome, this boundary line varied very much at different periods, the space was enlarged with the city itself; Parker, *Primitive Fortifications*, 8vo, London, 1878, p. 31; App. 78-84, *Walls and Gates;* and *Houses and Gardens*. 14. 78.

POMPADOUR STYLE; see French Architecture.

POMPEI (conte Alessandro), born 1705 at Verona; was educated at Parma; and after studying the best works on architecture, in 1731 designed for himself the villa Illagi at Verona. He then published *I cinque ordini dell' architettura civile di M. San Michele*, etc., fol., Verona, 1735: designed a palazzo for the marquess Pindemonti, in the village of Vo; and another for the conte Giuliari, in that of Sessino; a round church, octangular within, in the town of Sanguinetto, a dormitory with a grand staircase for the monks of S. Michele in Campagna: at Verona, the large *dogana* with a central court 160 ft. long (the *molo* was by L. Salembrini); the portico to the Philharmonic academy to contain the marbles and inscriptions of the marquess S. Maffei; the façade of the church of S. Paolo di Campo Marzo (only erected after his death); the marble pedestal of the Antenna dei Piazza; and the pilasters in the little piazza before the palazzo of the conte O. Pellegrini: and the library of the PP. Franciscani at Bergamo. The date of his death, probably after 1795, has not been found. 3. 25.

POMPEII. A ruined town of Campania, near Naples, in Southern Italy It belonged to the Oscans, then to the Tyrseni and Pelasgi; later it fell under the power of the Greek colonies of Cumæ and Parthenope; and about B.C. 440 of the Samnites. About B.C. 360 the Campanians claimed the protection of Rome. A great part of the town was destroyed A.D. 63 by an earthquake; another occurred later; and in 79 the town was entombed to a depth of 20 to 24 ft. by a series of eruptions of stones, cinders, and ashes from mount Vesuvius. Pompeii remained forgotten for nearly sixteen centuries, and was accidentally discovered 1689. Excavations were commenced 1748, and continued at intervals to the present day, yet only about one-third has been uncovered. The walls enclose an area of a little more than three-quarters of a mile by about a little less than half a mile, containing about 161 acres.

Pompeii must have nearly resembled in its principal features a modern Eastern city. The upper stories, sometimes more than one, of the houses, appear to have consisted chiefly of timber; they were either burnt by the red hot stones, or broken down by the weight of matter; remains of a second story, and especially of the *menianum* or projecting balcony over a street, have lately been discovered. The stairs were of brick or wood. The mean shops, mere recesses in the outer walls of the houses; the brick-built counter; the marble slabs; the awning stretched across the street; the caravanserai or khan outside the city gate with its many small rooms opening into a stable behind, and a court-yard in front, are all characteristic of a modern eastern town. But for the earthquakes, the town would have been a perfect example of a Greco-Roman city of the third class; hasty repairs are observable. The streets vary from 8 ft. to 22 ft. in width between the houses; the wider ones have one or more stepping-stones at the crossings between which the wheels of the *biga* passed. The houses are comparatively of small size. The shops, placed as above noticed, often belonged to the resident in the house behind, and varied from two or three rooms to a minor copy of a usual sized dwelling. The 'house of Pansa', the residence of one of the chief men, is sketched s. v. Atrium. An almost perfect house, probably the best preserved yet found, with a complete bath, and paintings in good preservation, is noticed as lately disentombed, in Times *newspaper*, 29 May, 1880. The villas were of various and larger sizes, but throughout all of them the rooms and halls were of small proportions. The tombs, of varied design, line the road to the city walls, approaching from Naples. The more ancient edifices are Greek in style, the recent are Roman. The whole plan and disposition of the forum is in conformity with the Roman practice as described by Vitruvius, and therefore supposed to be of a later date than the rest of the city and after A.D. 63: it differs in its form, and in the arrangements of the columns, from the Greek forum, owing to the difference of the uses to which it was applied. An essential feature in temples is the *podium* or basement on which they are elevated, the earlier examples in the town being placed, as by the Greeks, on steps only. The basilica is in good preservation, the walls, ranges of Ionic columns, and the tribunal, being still visible. The baths occupy



a space of about 100 feet square, and are divided into three separate and distinct compartments; one was appropriated to the fireplaces and to the servants; the other two were occupied each by a set of baths contiguous to each other, similar and adapted to the same purposes; perhaps for males and females.

The decorations, consisting of the rich, and in few instances almost unique, mosaic work to the floors, even representing pictures; the marble work, the stucco to the columns and walls painted in bright colours, with pictures and ornamentation in fresco and distemper, are among the most remarkable objects in the buildings of this town. "A Roman, from the testimony of Pliny, i, 35-6, was the inventor of that peculiar style of profuse architectural decoration common at Pompeii; which seems to have been so generally admired, that it became a fashion, to the exclusion of the more substantial style it superseded, to the great annoyance of Vitruvius, whose censure it seems to have awakened. This art obtained the name of *ropography*, its professors, *ropographers*, or twig-painters"; Suidas, quoted by Gell, *Pompeiana*, 8vo., 1817-19, p. 158. 1. 2. 6. 14. 23. 25. 28.

Jorio, *Plan de P.*, etc., 8vo., 1840. Fiorelli, *Tabula Coloniæ Veneriæ Corneliæ Pompeio*, in 42 sheets; also on a smaller scale.

History, etc. Moussinot, *Mémoire sur la ville souterraine découverte au bas du M. Vésuve*, 8vo., 1748. Fiorelli, *Pompeianarum Antiquitatum Historia*, 1748-1860, 2 vols., 8vo., Naples, 1860-62. Hamilton et de Murr, *Nuove scoperte in P.*, 4to., Nurem., 1770, 13 pl. Hamilton, *Discoveries at P.*, 4to., London, 1777, 13 pl. Saint Non, *Voy. Pitt. de Naples*, etc., fol., Paris, 1781-6, ii. Romanelli, *Viaggio*, 8vo., Naples, 1817. Wilkins, *Vues pitt. des ruines de P.*, 30 pl., fol. 1819. Real Museo Borbonico, 16 vols., fol., Naples, 1824-37. Mazois et Gau, *Les ruines de P.*, 4 vols., fol., Paris, 1812-38. Gell and Gandy, *Pompejana*, Two series, 4to., London, 1819-32; translated by

HITTORFF, 4to., Paris, 1827. HUBER, *Vues des ruines de l'ancienne ville de P.*, fol., 1824. PIRANESI, *Antiq.*, 36 pl.; *Antiq. de P.*, 2 vols., 72 pl.; and *Vues de P., armures*, etc., 66 pl. COCKBURN and DONALDSON, *Pompeii*, fol., 1827. LIGHT, *Views of P.*, 35 pl., fol., 1828. BONUCCI, *Pompei*, 8vo., Naples, 1828 and 1830. JORIO, *Guida da P.*, 8vo., Naples, 1828, with plan. ROSSINI, *Le Antichita di P.*, fol., 1830. RAOUL-ROCHETTE and BOUCHET, *Choix d'édifices inédits*, fol., Paris, 1828-30. *Pompeii*, by W. CLARKE, in *Library of Entertaining Knowledge*, 8vo., London, 1833; 1837; which has been enlarged by DYER, *Pompeii; its History, Buildings, and Antiq.*, 8vo., London, 1867; 2nd edit. 1868; DE CESARE, *Le ruine de P.*, 4to., 1838; BARRÉ and ROUX ainé, *Herculaneum et Pompeii*, 700 pl., 8vo., Paris, 1839-40, 1863, 1870-72; NICOLINI, *Le case e di monumenti di P.*, fol., Naples, 1854-63; 1862-65; PISTOLESI, *Antiq. of Herculaneum and P.*, 4to., 1842; DYER, *Ruins of P.*, 18 phot. views, 4to.; BRETON, *Pompeia*, 8vo., Paris, 1848; 200 cuts, 3rd edit. 1872; BARTLETT, *Pictures from Sicily*, 8vo., London, 1853; MONNIER, *Pompéi et les Pompéiens*, 8vo., Paris, 1864 OVERBECK, *P. in seinen Gebaüden, etc.*, Leipsic, 1856; 1867 re-written.

Ornament, etc. Gli ornati delle pareti ed i pavimenti delle stanze dell' antica P., 3 vols., fol., Naples, 1796-1808. NICCOLINI, *Quadro in Musaico scoperto in P.*, 4to., Ott., 1831, 2nd edit., 4to., Prat., 1832; ZAHN, *Les plus beaux ornements, etc.*, 250 pl., 3 ser., fol., Berlin, 1829-53; ZAHN, *Wandgemälde in P.*, fol., 1828. 40 pl.; ZAHN, *Ornamente aller Klassichen Kunst Epochen*, 4to., 1863. TERNITE, *Wandgemälde aus Herculanum und Pompeii*, with text by Müller and Welcker, 56 col. pl., fol., Berlin, 1839-50. RICHER, *Secrets de l'art décoratif; Fouilles récentes et anciennes de P.*, fol., Naples, 1875-8. RAOUL ROCHETTE, *Choix de Peintures de P.*, fol., Paris, 1844-6; and with BOUCHET, *Maison du poète tragique*, 27 pl., fol., Paris, (1845). PRESUHON UND STEEGER, *Die schonsten wände Pompejis*, 4to., Turin, 1877. GRUNER, *Ornamental Art*, fol., London, 1850, pl. 30-36. GOLDICUTT, *Ancient Decorations*, 4to., 1825. WRENCH, *Recollections of Naples*, being plates of the statues, etc., from "Il real Borbonico", 4to., 1839. ABBATE, *Decorative Painting of Pompeii*, read by WYATT, at Inst. of British Architects, *Sessional Papers*, April 1853. OWEN JONES, *Grammar of Ornament*, fol., London, 1857; pl. 23, Collection of borders from different edifices; pl. 24, pilasters and friezes, ditto; pl. 25, Mosaics, and from the museum at Naples. TROLLOPE, *Selections of Ancient Art*, 4to., 1854.

Detached references. MILLIN, *Desc. des tombeaux découverts à P. en* 1812, 8vo., Paris, 1813. AVELLINO, *Descr. di una casa Pomp., etc.*, 4to., 1837. FALKENER, *Museum of Class. Antiq.*, 8vo., Lond., 1851-2, gives the house excavated under his inspection. DALY, *Revue Générale*, 4to., Paris; s. v. Index. BRULOFF, *Baths of Pompeii*. GAILHABAUD, *Monumens*, 4to., Paris, 1842, i, house of Pansa. DENNIS, *Etruria*, 8vo., London, 1848, i, xxvi. ASHPITEL, *Blue and white vase found in P.*, pl., etc., in RICHARDSON, *Ornamental Design*, fol., London, 1849-51. SCHARF, *Pompeian Court at the Crystal Palace*, 12mo., 1854; a view of which is given in BUILDING NEWS *Journal*, 1857, iii, 484. CHABAT, *Fragments d'Arch.*, 4to., Paris, 1877, pl. 6; 8; 14; 42; 44; gives a portico in the forum; entrance door of a house; curb-stone of wells; entablature from the triangular forum, and temple of Æsculapius. Drawings in the library of the Royal Inst. of Brit. Architects. *Illustrations*, Baths and Washhouses; Columbarium; Pavement. WOODS, *Letters*, 1828.

ILLUSTRATED LONDON NEWS, 1846, viii, 381, giving the 'house of the hunter', notices that up to that time little more had been excavated than published in the Society's work, 1837. BUILDER *Journal*, 1845, iii, decay of paintings, 104. 1856, xiv, 656, new baths near Stabian gate. 1862, xx, 626, a baker's oven with loaves; 723, two houses excavated; 810, glass windows and wall lined with lead. 1865, xxiii, 84; 115, *Pompeii*, by R. P. Spiers. 1871, xxix, 741, *Pompeii revisited*, by H. C. Barlow. 1876, xxxiv, *Pictorial Art of Pompeii and Rome*, by T. Bonnar of Edinburgh, 382 and 415. BUILDING NEWS *Journal*, 1865, xii, 56, 77, *Pompeii*, by R. P. Spiers. 1874, xxvii, discoveries 739; and xxxi, 655. CIVIL ENGINEER, ETC., *Journal*, 1845, viii, 391, excavations. 1864, xxvii, *On Pompeii*, 26, 47, 81, 125 and 239: excavations, 339. ACADEMY *Journal*, 26 June 1875, excavations for dowager queen of Sweden. QUARTERLY REVIEW, April 1864.

AGGER; AMPHITHEATRE; ATRIUM; BAKERY; BASILICA; BATH; DOOR (stone); FORUM; JUNO; MOSAIC WORK (p. 128); PAVEMENT; PEACOCK; PERISTYLE.

POMPEION. The name of a public edifice, erected by the side of the port of Phalerus, near Athens, in which all the sacred utensils and other things necessary for the celebration of the fêtes were kept. 2. 6.

POMPEIOPOLIS; see SOLI, in Cilicia.

POMPEIUS AGASIUS (SEXTUS), "architect", built A.D. 10 an ædicula at Rome, according to the inscription given in GRUTER, *Inscrip.*, dcxxiii, 3.

POMPELON, perhaps from Pompeiopolis; the ancient name of PAMPLONA, in Spain.

POMPEY'S PILLAR, properly the column of Diocletian, erected 296 at ALEXANDRIA, in Egypt.

PONCE (M.); see URRANA (M. PONCE DE); and TREBATTI (PAUL PONCE).

PONCELLO (SEBASTIANO and TOMMASO), natives of Oneglia, practised largely at Genoa; the former died there 1657. 37.

PONCOILOISES. A word used *cir.* 1632 in the difference between the carpenters and joiners of the city of London, as that of a structure or implement to be made by the former artisan. JUPP, *Hist. of Carpenters' Co.*, 8vo., London, 1848, p. 301.

POND. A hollow, more or less deep, formed in the ground so as to hold water. The proper formation in various soils is detailed in BUILDER *Journal*, 1862, xx, 300; xxxiii, 782; 792; 847. JOHNSTONE, *Theory and Practice of Draining; on Embankments; formation of Ponds*, etc., 8vo., London, 1834. *Overflow from storm-water;* BUILDING NEWS *Journal*, 1875, xxix, 521. An elegant example in the villa Negroni at Rome, is given in LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 565; from FALDA, *Fontane e Giardini di Roma*, fol., 3 vols., cir. 1685. Publications on the gardens at Versailles, etc.

PONDERA of glass, in XIV cent., was equal to 5 lbs. weight; GLAZIER.

PONGIONE or PONGRONO (AMBROGIO), is mentioned as an hydraulic engineer on works for Milan cathedral, March 20, 1388; his name again occurs July 13, 1391. FRANCHETTI, *Storia del duomo*, 4to., 1821. In GIULINI, *Memorie*, 4to., Milan, 1761-71, xi, 437, he is named as the sixth "magister".

PONS. A monk of XI cent. erected the church of Moutierneuf at Poitiers, which was dedicated 24 January 1096. *Bulletin Mont.*, ix.

PONSARD (FRANÇOIS), architecte des bastiments du roy, died 28 January 1670, aged about 96 years. HERLUISON, *Actes d'Etat*, 8vo., Orleans, 1873.

PONSONELLI (GIACOMO ANTONIO), practised at Genoa, and died in 1735. 37.

PONTE (ANTONIO DA), born 1512 at Venice; was called GIOVANNI by many writers, properly A. dal Ponte de Conte, or Contino, obtaining his appellation 'da Ponte' from the new bridge at Venice. He studied under Scarpagnino; repaired the old timber bridge; restored the public edifices of the Rialto; and built 1588-91 the present bridge of the Rialto, over the grand canal, 94 ft. 6 ins. span, from the design of Gio. Alvise Boldu, according to the incontestable authorities cited by MAGRINI, *Intorno al vero architetto del ponte di Rialto*, 8vo., Vic., 1854, pp. 12-9, and app.; SELVATICO, p. 358; CARLEVARII, *Fabriche di Venezia*, fol., Ven., 1703, pl. 56-7; RUSKIN, *Stones of Venice*, 1851-53, iii, 321. He designed the porta del collegio al palazzo ducale (SELVATICO, p. 362): the sala del collegio, and the anticollegio or guardroom, in the ducal palace after the fire of 1574, and the sala del maggior consiglio, 175½ ft. long, 84½ ft. wide, and 51⅓ ft. high, and the adjoining one del Squittinio or Scrutinio, after the fire of 1577, with a reparation of the palace; some of the works are

also attributed in the *Handbook* to Palladio and to Sansovino: also *la tana*, the rope-walk, in the arsenal, 910 ft. long (perhaps since rebuilt in early part of XVIII cent., as it has now 92 doric pillars); began 1589 the two fronts and interior of the *publiche prigioni* or *carcere*, for 500 persons; with the ponte de' Sospiri or bridge of sighs (SELVATICO, p. 360); the church de' monaci di Sta. Croce on the canal grande; and the gate of the church of the ospedale degli Incurabili. He died 20 March 1597, aged 88, according to SELVATICO and MILIZIA; or only 85 years according to the above dates also given by the latter. His works were continued by his nephew, A. CONTINI. CADORIN, *Pareri di xv Archit.*, 8vo., Venice, 1838, pp. 105-7. TEMANZA, *Vite*. SELVATICO, *Archit. in Venezia*, 8vo., Venice, 1847, p. 353-62. 1. 3. 12. 25.

PONTE (BERNARDINO); see CONTE (B.).

PONTE (PAOLO dal), born at Vicenza, supposed to be a brother of ANTONIO, was 1567 engineer or *proto* of S. Marco at Padua, and carried out many canal works. CADORIN, *Pareri*, 1838, pp. 41-9. TEMANZA, *Vite*. SELVATICO, *Venezia*, p. 362. MAGRINI, *Intorno*, p. 26.

PONTE (fra GIOVANNI DA); see GIOCONDO (fra G.).

PONTEFRACT (ROBERT DE). Henry de Aberford prior (1312-28) of S. Oswald at Nostell in Yorkshire, commenced building a new choir, and entrusted the work to this Robert, who, through envy, ran the expenses to a most extravagant height in order to have the work stopped. ASSOCIATED SOCIETIES, *Reports and Papers*, 1854-55, p. 242-3. HUNTER, *South Yorkshire, Doncaster*, fol., Lond., 1836, ii, 207.

PONTELLI (BACCIO), as he subscribed himself, or PINTELLI as usually written; of Florence, was employed at Rome, especially by pope Sixtus IV (della Rovere 1471-84), for whom he designed 1471-77-87, the church and monastery of Sta. Maria del Popolo (altered by Bernini, modernised by G. B. Piranesi; monastery replaced by Valadier on another site; LET., 518, pl. 233); also several chapels therein; (the third one is given in LET., 536, pl. 236). In 1473-75, he erected at the Vatican the great library under the rooms of pope Nicolas V; and 1473-74, the cappella Sistina (plan, etc., are given in *Third Report* of the Commis. on the Fine Arts, fol., 1844). He rebuilt 1471 the church and a great portion of the vast hospital of Sto. Spirito in Sassia, part attributed to S. Pollajuolo, LET., 542, pl. 256), adding the long loggia decorated by himself; restored and strengthened the ancient ponte Sisto over the river Tiber, using the old materials of the Janiculum bridge: designed the small churches erected in the jubilee year 1475, among which are those of SS. Apostoli (renewed 1702-24 by F. Fontana, except the portico, which was rebuilt probably by N. Salvi; LET., 363, pl. 167): that of S. Pietro in Vincoli with the monastery (altered 1705 by F. Fontana; LET., 320, pl. 140): and that of S. Sisto, now modernised: designed the church of S. Giacomo dei Spagnuoli, now closed (LET., 539, pl. 253): that of S. Cesareo de' Somaschi for the Dominicans (TITI, *Ammaestramento*, 12mo., Rome, 1686, p. 59): *cir.* 1475 the cathedral of Sta. Aurea at Ostia, with the steps and façade; and probably the castello, which was carried out by G. da San Gallo. At Assisi, where he was sent 1480 by the pope, he erected a range of massive buttresses to support the north wall of the church of S. Francesco; having a few years earlier erected many halls and chambers to the monastery. At Rome, 1480-83, he designed the church of S. Agostino (altered 1740 by Vanvitelli), said to have had the first cupola (or one of the earliest) in Rome (ROSSI, *Nuovo Splendore*, fol., Rome, 1686-8, iii, pl. 5; WEBB, *Cont. Eccles.*, 8vo., London, 1848, p. 489; LET., 351, pl. 157); and made, 1481, a design for a palace at Urbino; (GAYE, *Kunstblatt*, No. 86, etc., for 1836; and his *Carteggio*, 8vo., Flor., 1839, i, 274-7); possibly the one on which L. Lauranna had been engaged from 1468, perhaps continued 1484 by Pontelli: and the palazzo ducale at Gubbio, now partly destroyed; it is also attributed to L. di MARTINI Benverardo da Laurana, and to F. di G. MARTINI; and at Rome 1487 the church and cloister of Sta. Maria della Pace (the monastery 1504 by B. Lazzari, restored by P. Berretini da Cortona; LET., 204, pl. 63). Pontelli's last work was 1491 the church of Sta. Maria delle Grazie at Sinigaglia; and he is supposed to have died 1490 or 1491, at Urbino.

The following works at Rome are attributed to him;—1472, the church of S. Pietro a Montorio, but it was probably carried out by a disciple (LET., 183, pl. 44); "The little palace of Venice", adjoining the palazzo di S. Marco, now Venezia (LET., 215-21, pl. 73); the entrance to a house in the via del Gesu, of Paros marble (LET., 340, pl. 151); the hospital de' Genovesi (LET., 231, pl. 91); the well in the monastery of the Gesuiti Penitenzieri (LET., 536, pl. 250); and the cortile of a house near the palazzo Mattei, piazza delle Tartarughe (ROSSINI, *I Monumenti*, fol., Rome, (1818), pl. 47). VASARI, *Lives*, German edit., iii, 26; and Engl. edit., 1851, ii, 90. MORONI, *Diz. Eccles.*, 8vo., Ven., s. v. Urbino, p. 213-4. LETAROUILLY, *Rome Moderne*, 4to. and fol., Paris, 1825-60, referred to in the text. WARING, in BUILDING NEWS *Journal*, 1872, xxii, 374. DALY, *Revue Générale*, xiv, 306. 3. 25. 28.

PONTIFEX. A college of priests, instituted by Numa Pompilius, called *pontifices* from *potens*, powerful (PLUTARCH, *Lives*, s. v. Numa), who had the principal direction of religious customs. At first it comprised four patricians; L. Sylla added eleven others, making the first eight *pontifices majores*, and the others *pontifices minores*, the chief being *pontifex maximus*. The name is also supposed to be derived from *posse facere*, able to do; and not from *pontem*, a bridge. HOFFMANN, *Lexicon Universale*, fol., Leyden, 1698, iii, 836, col. 2: GLAIRE AND WALSH, *Encyc. Cath.*, 4to., Paris, 1840-8, xv, xvi. DUCANGE, *Gloss.*, s. v. Pontium exstructor; and Fratres Pontis, Charta an. 1471 pro Hospitalis Pontis S. Spiritus, ex schedis D. Lancelot. (CURATORES). Benevolent persons possessing rights of ferries, erected hostelries and finally bridges. Fraternities of such persons in the middle ages were called *pontifices*. It is not known whether the shepherd S. BENEZET was the founder of these fraternities, or merely one of the earliest members of an association the origin of which is still undeveloped. According to the usual legend, he directed the now nearly destroyed bridge at Avignon, commenced 1178; a toll was levied 1185. By a charter of 1187 his successor Johannes Benedictus, prior of the bridge, obtained for himself and brethren a chaplain and a chapel with a cemetery. The completion of this bridge in 1188, four years after the death of S. Benezet, confirmed the fame of the bridge-building fraternity, which was chartered 1189 by pope Clement III, and in 1185 began the construction of the pont du S. Esprit at Lyon, not completed until 1305. The decay of the institution is as obscure as its foundation; but at Bon-pas on the river Durance, charters of 1270 mention such a society; and at Lourmain, between Aix and Apt, etc. An inscription found in the chapel near the place whence the ferry boat ordinarily starts from Mirabeau on the Durance, gave rise to investigations on this subject, conducted by GRÉGOIRE, *Recherches historiques sur les congrégations hospitalières des frères pontifs*, 8vo., Paris, 1818; and by MILLIN.

The bridges in France, Italy, Sweden, Denmark, and Spain, which are supposed to owe their construction to this origin, all date from about the same time; and the Swedish Chronicles mention a Benedict, between 1178 and 1191, as a bishop and bridgebuilder at Skard; but the traces of analogous fraternities in Germany and England have not yet been discovered. The tenants of the chapels common on mediæval bridges, were only trustees of the bridge, as appears from documents in the *Rotuli Lit. Claus.*, A.D. 1205, m. 15, and in the *Rotuli Lit. Patent.*, A.D. 1265, m. 43, in which last the king takes from the brethren and chaplains ministering in the chapel of S. Thomas upon London bridge, the custody of the bridge with all its appurtenances, rents, and tenements, and commits it to the master and brethren of the hospital of S. Catherine. After this period, these fraternities are unknown. Peter of COLECHURCH, priest and chaplain, who 1176 commenced London bridge, was superseded, in consequence of an order from the king, by the clerk ISEN-

BERT, master of the schools of Xainctes; *Rotuli Lit. Patent.*, A.D. 1201, m. 1. John IV, bishop of Prague, when at Avignon, *cir.* 1323 invited a GUILHELMUS to Prague, to build 1333 the bridge over the river Elbe at Raudnitz. The property of these fraternities is said to have been found in many instances in the hands of the Order of S. John of Jerusalem; and the Templars of Spain had the duty of aiding the passage of pilgrims to Jerusalem. The habit of the knights of the hospital of S. Jacques du haut pas, at Paris, exhibited a *pick* on the breast; while that of the fraternity *du S. Esprit* at Montpellier, showed two bridge arches and a cross. BUILDER *Journal*, 1845, iii, 497. The modern continental establishments "des ponts et chaussées" may be considered successors to the above institutions. CRESY, *Encyc. of Civil Engineering*, 250; 413-5. GAILHABAUD, *Monumens*, 4to., Paris, 1842-52, iii, s. v. Avignon. LLAGUNO, *Noticias*, etc., 4to., Madrid, 1829, i, 28; 43; 51; 62. DALY, *Revue Générale*, 1840, i, 24. 14.

PONTIFICAL ALTAR. An isolated altar, such as that under the dome of S. Peter's at Rome, covered by a baldachino; and as at S. Sulpice at Paris, facing the west; Notre Dame, at Paris, etc. It was usually so placed in the great Roman basilicas. PORTABLE ALTAR.

PONTIFZ (GUILLERMO or GUILLAUME), succeeded 1462 to G. Richer as master of the works at Rouen cathedral. He decorated the portail de la Calende; completed 1463-7 the tour S. Romain; 1477-79 the chapter library and its stone staircase; the *cloture* of the choir and of the sacristy; 1484 the portail of the cour des libraires; and 1487-96 the tour de Beurre. Being old, J. Leroux was appointed under his orders at the tower works, and he died a few months later. DEVILLE, *Revue des Arch.*, 8vo., Rouen, 1848, p. 35-44. LENOIR, *Arch. Mon.*, ii, 271.

JEAN PONTIF, master of the masonry works to the city of Rouen; 1478 visited the fortifications of Pont Audemer. CHENNEVIÈRES, *Archiv de l'Art Franc.*, 2 series, i, 441-2.

PONTIO (FLAM.); see PONZIO (F.).

PONTIUS. The architect who set up the obelisk at Alexandria, in the seventh (or eighth, 22 B.C.) year of Cæsar Augustus; Barbarus being prefect of Egypt, according to the inscriptions found June 1877, and given in ATHENÆUM *Journal*, July 7, No. 2593, p. 23.

PONTOISE. A town of the department Seine et Oise, in France, with quarries supplying much stone of a good quality for the Paris trade. BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 14. DALY, *Revue Générale*, 4to., Paris, 1852, x, 273, pl. 13-15; *Concours*, xiv, 106. 28.

PONTOISE (P. DE), was 1317 masson juré to king Philippe V of France. He succeeded to Regnault le Breton. LANCE, *Dict. Biog.*, 1871.

PONTUS. A province of Asia Minor. HAMILTON, *Researches, etc., with the Antiquities and Geology*, 12 pl., 8vo., London, 1842. PERROT ET GUILLAUME, *Explor. Arch.*, — *du Pont en* 1861, fol., Paris, 1862-72.

PONTONES (fra ANTONIO DE S. JOSEF), born 1717 at Liérganes, Santander, in Spain, was taught the trade of a mason by his father, at Palencia and at Escalona. On his death, the son went to Valladolid to study architecture, and having been approved he was employed to restore the crypt in the Benedictine church at Sahagun; to build the capilla del pilar in the cathedral at Ciudad Rodrigo; and other works in Castile. Pontones then retired to the Hieronymite monastery of Mejorada, took the habit 8 Sept. 1744; rebuilt the nave of the church, designed and erected a library, chapter room, etc., with, at his own expense, two small chapels in the sacristy, supplied the monastery with water, and effected many other improvements. He published *Arte de Molineros, ó tesoro económico para la Mejorada*. Between the Escurial and its offices, he 1744-74 formed the *mina* or underground passage, 181 ft. long, 7 ft. wide, and 10 ft. high, for which work he was appointed architect to the king with a salary of 30 reals a day. He designed the portico of San Vicente de Avila; and, while engaged on the convent of Nuestra Señora del Pardo, close to Valladolid, after a fire, he died 17 Oct. 1774. 66.

PONT-Y-TU-PRIDD, near Llantrissent, in North Wales; see EDWARDS (W.)

PONYNCHYS, probably PUNCHEONS, as used 1532 at Durham; SURTEES SOCIETY, *Finchale Priory*, 8vo., London, 1837, p. 445.

PONZIO (FLAMINIO), also written PONTIO, a Milanese, studied at Rome, where he designed 1600-3 (his finest work) the façade to the palazzo Sciarra Colonna de' Carbognano. (FALDA, *Palazzi*, ii, pl. 36; LET., p. 127; 326; pl. 143; see 3; 28; and M. LUNGHI): 1603 the palazzo Borghese Rospigliosi on the site of the baths of Constantine (LET., p. 672; pl. 328), later Bentivoglio (enlarged by C. Maderno; FALDA, pl. 15 is perhaps the gardens): 1611-13 the rich capella Paolo or Paolina, or Borghese, or della Vergine, in the basilica Liberiana or Sta. Maria Maggiore, similar to the Sistine chapel on the opposite side (LET., p. 326-7, pl. 143; p. 606; 610-2; 616; 632; 636; pl. 308; the plan of the chapel and section with the altar, are in ROSSI, *Disegni di vari altari*, fol., Rome, n.d., pl. 43-4): and the sacristy in the same edifice: 1610 with O. Mascherino continued by C. Maderno, the façade of the cortile with the grand double staircase therein, with the cappella papale (or by C. Maderno) to the palazzo Quirinale or pontificio, on Monte Cavallo, and part of the palace (FERRERIO AND FALDA, *Palazzi*, fol., Rome, [1655], pl. 2; pl. 48-50; LET., 611; 616-8; pl. 304; ROSSINI, *Monumenti*, fol., Rome, [1818], pl. 4; 32): 1611 rebuilt the basilica of S. Sebastiano fuore delle murà up to the cornice; but TITI only mentions the tribune with its cupola and lantern, and the decoration of the high altar; the capella S. Sebastiano is by C. Ferri: designed the gardens of the palazzo Borghese fuori di porta Pinciana (FALDA, *Giardini*, fol., Rome, 1670; pl. 6): additions on the left hand side to the palazzo Scipio Borghese with its portone next the via di Ripetta, with the *ringhiera* (LET., p. 376; pl. 175), begun 1590 by M. Lunghi and completed by C. Maderno: the capella de' Erreri dedicated to S. Diego, in S. Giacomo degli Spagnuoli (TITI, p. 123): the casa for the cavaliere G. Cesari d'Arpino: a casino for the monks of S. Urban at S. Maria di campo Carleo: and the entrance to, if not the whole of the villa Mandragone, (now a deserted palazzo Borghese) at Frascati (PERCIER ET FONTAINE, *Maisons de Paris*, fol., Paris, 1824, pl. 52-4). He died a short time before the pope (1621), aged 45 years. G. Vansantio, or Vasanzio, or Jan VAN SANTEN, called Fiamingo, was a pupil, and assisted in completing many of the above-named edifices, but died 1623. TITI, *Ammaestramento*, 12mo., Rome, 1686, p. 57, 123. PISTOLESI, *Descr. di Roma*. 3. 25. 28. 62. 111. 112.

POOD. A weight used in Russia, equal to 40 pounds Russian, or 36.11408 lbs. Avoir. English.

POOLVASH QUARRY, near Castletown, Isle of Man, supplies a good black limestone, which takes a polish and is little inferior to marble. MANX FLAGSTONE. 71.

POONAH. (Hind. *Puna*). The capital until 1818 of the Mahratta confederacy, now a town in the province of Aurungabad, in Hindostan. Among the chief works are a Hindoo college established 1821; S. Paul British church, begun 1863; a Scotch church; a government house at Gunesh khind (ILLUSTRATED LONDON NEWS, 1870, 12 March); a great bund (*idem*. 1851, xviii, 172); an extensive aqueduct; a civil hospital, built and endowed 1863 by David Sassoon; the large palace of the peishwa ruined 1828 after a fire; and the unfinished tomb of Madhajee Sindia, died 1794. Near the town is the hill or fortified temple of Parhuttee, Parbati, or Durga, erected 1749, and has seven temples: a peculiar rock cut Saiva temple, given in FERGUSSON, *Indian Arch.*, 8vo., London, 1876, p. 446-7; and JACQUEMONT, *Voyage dans l'Inde*, 4to., Paris, 1835-44, iii. 584, pl. 80: the Sungum formerly the British residency; and a stone bridge designed by major Nutt, Bombay engineers. The rock cut temple of KARLI is not far distant. HEBER, *Journey*

through the Upper Provinces in 1824-5, 4to., London, 1828. Anon., *Life in Bombay*, 8vo., London, 1852, p. 152-66. Postans, *Western India in* 1838, 12mo., London, 1839. 14. 28. 50.

POONAY. A timber of the woods of Tinnevelly, of a deep straw colour, used for building purposes. 71.

POON WOOD; see Dillenia: or Peon Wood; see Calophyllum.

POOR, PORE, or Pur. The Hindostanee term for a town, and often affixed to another word, as Bhurtpore or Bharatpur, the town of Bharata.

POOR, Poore, Pore, or le Poer, i.e., pauper (Richard), born at Tarrant in Dorsetshire, became dean of Salisbury; 1215-17 bishop of Chichester; 1217-28 bishop of Salisbury, when he transferred the seat of the bishopric from Old to New Sarum, and 28 April 1220 the new cathedral was commenced under Elias de Dereham, or Berham. From 1228 he was bishop of Durham, where he commenced the eastern chapel of the nine altars. He died 1237 at Tarrant, where he had founded a Cistercian nunnery. His tomb, in the aile at north end of the east transept of the cathedral, is given in Dodsworth, *Salisbury*, 4to., 1814, pl. 3; p. 37; 211-2. Willis, *Chichester Cath.*, 1861, p. 4, expressly states that Poor was not an architect.

POOR HOUSE. The term in use about 1838 for the building erected under the various acts of parliament for the relief of the poor. It is now called workhouse; also union workhouse or "union", when two or more parishes join in erecting an edifice for such a purpose.

The term was also used formerly for the almshouse, or hospital, a refuge for the indigent. Thus, Turner and Parker, *Domestic Arch.*, 8vo., Oxford, 1851-59, ii, 194, iii, 45, write, "The hospitals or almshouses of England would form a valuable series of illustrations of domestic architecture of a particular kind, from the God's House at Southampton of the twelfth century, and the maison de Dieu at Dover, down to the numerous almshouses of the time of Elizabeth and of James I, including such establishments as the hospital at Ewelme in Oxfordshire, S. Cross near Winchester, Chetham's hospital at Manchester, etc. But they would alone afford materials enough for a separate work": and iij, 179, they give an illustration of Neville's hospital, an almshouse founded 1448 at Sherborne in Dorsetshire. "Many remain quite intact, as Ford's hospital at Coventry, the almshouse at Sherborne in Dorsetshire, Ewelme hospital in Oxfordshire, the Leicester hospital at Warwick: But many have been rebuilt in modern times", as William Wyggeston's hospital at Leicester; Associated Societies, *Reports & Papers*, 1878, p. 260. The college of the poor of queen Elizabeth at East Greenwich, founded by William Lambarde, erected 1575-6; cost £2642 8s.; Nichols, *Progresses*, 4to., London; 1823, iii, 561. Publications are quoted s. v. Hospice.

Viollet le Duc, *Dict.*, i, 324, notices that the mediæval houses of refuge, scarcely sufficient for the miseries of ordinary times, could not provide asylums for the workman contending against the regulations of his guild, or for the disabled or disbanded soldier; these classes so strengthened the corporations of beggars that in the seventeenth century the great hospitals were rebuilt in order to centralise the resources of the refuges and hospitals in the large towns: thus the hôpital central des Invalides was founded; and the Salpêtrière, called by Sauval, *Histoire*, fol., Paris, 1724, *maison de renfermement des pauvres*, was built.

POOR RATE ASSESSMENT ACT, 32 & 33 Vict. c. 41; 26 July 1869, § 3 and 4. This act is (*inter alia*) to enable owners of small tenements to compound with the overseers for the payment of rates; it having been found impossible to insist on a personal payment of rates by weekly tenants. Under this act the owners of rateable hereditaments under £20 in the Metropolis; £13 in Liverpool; £10 in Manchester or Birmingham; or £8 elsewhere, may be rated instead of the occupiers by order of the vestry, or by agreement, and the owner is then allowed a commission of 15 per cent. W. J.

POORTERMANS (Pieter), took the oath 1688 as architect to the town of Brielle in Holland; the town gates called Lange poort and Zuid poort are considered to have been designed by him. 24.

POOVEY. A timber of the woods of Tinnevelly, of a light brown colour, used in building. 71.

POPE (Thomas), of Philadelphia, also a landscape gardener, published *Bridge Architecture*, 8vo. New York, 1811; he had then been practising 33 years.

POPELLMANN; see Poepelmann; and Poppelmann.

POPLAR WOOD; see Populus.

POPOLI. A town in the province of Abruzzo Ultra II, in southern Italy. Over the bridge crossing the river Aterno is a circular tower without door or window. The church exhibits the same peculiarities of architecture as those of Aquila (1312-27) and Solmona. 23. 28. 50.

POPPELKEN (Cord), finished 1500 the *dom* at Bremen. 92.

POPPELMANN (N.), published *L'Orangerie royale de Dresde, avec ses pavillions*, etc., fol., Dresden, 1729, with 24 plates. Poepelmann.

POPPY, *Papaver*. A plant of Turkey, Asia Minor, Persia, and Hindostan, and greatly venerated by the Egyptians, who represented the god of sleep as crowned with poppies. Sometimes he is represented couched upon a bed of this flower. It was esteemed as a symbol of fecundity, on account of the number of seeds produced by each flower. Bryant, iii, 242. Fosbroke, 208, Potter, i, 450. The poppy, Gr. *μήκων*, (although the Gr. name for any bell is *κώδων*, from *κώδεια*, poppy head) seems to have been originally a mystic title of Neptune, and also the name of some architectural ornament. It alternated with the *pomegranate* on the Israelitish High Priest's robe; but as it does not grow in Greece, the poppy appears to have been substituted as an emblem nearly approaching it in shape, crest, and profusion of seeds. It was the usual emblem of Demeter or Ceres; was carried along with pomegranates in her mysteries at Eleusis; is found carved on the altars of Juno, Aphrodite, Neptune, Mithras, and other divinities; is held in the hand of Hope; and at Pompeii is associated with ears of corn. A red jasper, in the Stosch collection, exhibits a poppy head encircled by a serpent. Lochner, *Mekonopaignion; sive Papaver*, etc., 4to., Nur., 1713, has collected the monuments on which the poppy is depicted. Gruter, *Corpus Inscrip.*, i, 102, gives a bas relief of Hope holding ears of corn and heads of poppies. Pomegranate. 2. 6. 14.

POPPY HEAD. A term given to the ornamental apex of a bench end. Anglo-Saxon *popig.*: The Fr. *poupée* is given by Lassus and Willis, in W. de Honecort, *Sketch Book*, 4to., London, 1859, p. 185; 193; 199; and *Gloss.* of the French edition, 4to., Paris, 1858; but "no examples are known of earlier date than the Decorated style, and but few so early"; *Glossary of Arch.* In the contract 1450, relating to the Beauchamp chapel at Warwick, "a pair of desks of timber with poppies, seats, sills, planks", etc., are mentioned; and "popie heedes off the seites" are named in Hearne, *Antiq. of Glastonbury*, in reference to the desks for the *library* of Christ Church College, Oxford: where in the *chapel* it is carved into oak leaves and acorns; Associated Societies, *Reports and Papers*, 8vo., Lincoln, 1855, p. 294, wherein it is considered it was introduced (possibly from the east) at the close of the crusades and in the times of the first Edwards. In the chapel of Henry VII, one of the stall heads is a figure of that monarch; Pugin, *Specimens*, ii, pl. 40: male and female heads in the church of Stanton S. John, Oxfordshire, are given in Archæological Journal, 1847, iv, 86, "of the latter part of the xv cent. or early in xvi cent., to which period most of our carved bench ends and poppies belong". Colling, *Gothic Ornaments*. Apparently no examples are shown in Viollet le Duc. *On Poppy heads*, in Ecclesiologist *Journal*, 1846, v, or New Ser., ii, 209-16 with plate; *idem*, 1849, ix, 45, quoting Harrison, *Letter—on Fitness of Gothic Arch. for Modern Churches*, 8vo., London, 1848.

POPPY OIL. The oil of pinks and oil of carnations, of old writers. One of the three fixed oils used in painting pictures. It is not considered to possess any properties for which it should be preferred to LINSEED OIL. FIELD, *Grammar of Colouring*, 8vo., London, 1848, p. 139.

POPULONIA. A colony of the ancient Volaterræ; situated near Piombino in Central Italy. It was the naval arsenal of Etruria; and was ruined in the time of Strabo (*cir.* A.D.). Little else remains than the walls formed of squared stones of Macigno, in irregular but horizontal courses, varying from 1 to 7 ft. in length; *Pompeii*, in LIBRARY OF ENTERTAINING KNOWLEDGE, 8vo., London, 1831, i, 63; DENNIS, *Etruria*, 8vo., London, 1848, ii, 236-43. The feudal castle with machicolated battlements is picturesque. The former cathedral dating from 501 is now the church of Sta. Croce. 28. 96.

POPULUS. The Poplar (Fr. *peuplier*), belongs to the natural order Salicaceæ. It is a deciduous tree, thriving best in moist soils or near water. In England the timber is principally used for floor boards; and for dishes, casks, etc.: the grey poplar being the whitest wood of any of the species is used in France and Germany for carving and lighter parts of architecture. The wood is soft, light, of a white or pale yellowish colour, easy to work in carving and turning, very durable when kept dry, not liable to warp or twist when sawn up (but it should be seasoned 18 or 20 months, being liable to cast or warp in working), and from its elasticity yields without splitting or cracking when struck with violence. That of some species is very slow in taking fire, and when it is ignited burns in a very smouldering manner, without flame, on which account it has been considered good for the flooring of manufactories, theatres, and workshops. NOTES AND QUERIES *Journal*, 1874, 5 Ser., i, 355: also BUILDING NEWS *Journal*, 1874, xxvi, 227. Poplar boards to bedrooms and kitchen offices have been laid down for 35 years and were as sound as at first: as window shelves and other places, it has decayed, become grub eaten or otherwise in a few years: and from other statements, this wood appears to require to be kept dry; CIVIL ENGINEER, ETC., *Journal*, 1840, iii, 419. WARE, *Body of Arch.*, fol., London, 1767, i, 21, says "there are old houses in this country floored with sycamore and wainscotted with poplar: the wainscot has never been painted, but retains a good colour, and floors stand excellently, and are very pretty." The bark is nearly as light as cork. TREDGOLD, *Carpentry*, 4to., London, 1828, p. 237. MICHAUX, *N. American Silva*, 8vo., Phil., 1817; new edit., 1871. HOLTZAPFFEL, *Descr. Cat.*, 8vo., London, 1843. LOUDON, *Country Residences*, 4to., London, 1806, ii, 482. 14. 71.

1. P. Alba, white P., more commonly Abele tree. In Tuscany, *Gallice*. Great Britain and most parts of Europe, 80 to 100 ft. growing very fast. Weighs 27 lbs. 11 oz. per cubic ft.; another specimen 25 lbs. 9 oz.
2. P. Canescens, Grey P. The wood is finer and better than the above. The roots send up suckers, and by them a succession of young trees may be kept up. After 50 years growth the heart wood is liable to decay.
3. P. tremula, Trembling P. or "Aspen". There are many varieties of this rapidly-growing tree: Great Britain, South of Europe, Caucasus, Lapland, and very abundant in Russia. Weight 31 lbs. 2 oz.; a specimen from Scotland 34 lbs. 6 oz. It has horizontal branches which become pendulous by age. Scaffold poles, and for sides of ladders, and turnery.
4. P. trepida, American Aspen. North America; 20 to 30 ft.
5. P. grandidentata, large American Aspen; 40 to 50 ft.
6. P. Græca, Grecian poplar.
7. P. nigra, Black P. In Tuscany, *Albero*. Great Britain. 70 to 80 ft, rapid growth; wood softer than P. tremula, easier to work, and splits more easily than any other of the species.
8. P. Canadensis, Canadian P., Canada, and Virginia. 70 to 80 ft. In America it is considered the best for planting. The avenues at Versailles are formed of this tree.
9. P. monilifera, Black Italian P.; America, where it is called Italian poplar, and in France *peuplier Suisse*. It is the most rapidly growing of all the poplars. The timber is considered in England equal, if not superior, to that of any other species. Near London it has grown 30 to 40 ft. in height in seven years; and attains a height of 100 to 120 ft; in America, only about 70 to 80 ft. In the middle of May it sheds its seeds, which are covered with a cottony down.
10. P. fastigiata or pyramidalis, Lombardy or Cypress P.; known best by its nearly upright branches. Italy on the banks of the Po; Persia and the Himalaya. 100 to 120 ft. The wood being inferior is used for packing cases, rafters, small beams, studs, boards, etc.
11. P. balsamifera, Balsam bearing P. or Tacamahaca tree, North America, Da-uria, and the Altai. 80 ft. Useful in ornamental planting in place of the former.
12. P. betulifolia, heterophylea, angulata, and candicans, are also American species, cultivated in England.

POPYNJAYE (RICHARD), was appointed surveyor of work, at Portsmouth, 1560; payments were made to him in 1562; British Museum, Addit. MS., 5752, f. 315, and 319. He is also mentioned 1568 in RECORD OFFICE, *Calendars*, (Domestic Series), p. 311. He succeeded — Ridgeway.

PORATA (GIACINTO); see PORRATU (J.)

PORCELAIN. The name given to all white and semitransparent earthenwares; it is first noticed in Europe about 1581, being then introduced by the Portuguese traders from China. While the paste [CLAY. GRANITE (p. 47)] for porcelain is translucid, that for POTTERY (under which publications are given) is almost opaque, and for EARTHENWARE it is quite so. GUTZLAFF, *China Opened*, 8vo., 1838, p. 88-9. KAOLIN. FAENZA. PALISSY-WARE. 14.

PORCELAIN TOWER OR PAGODA; see NANKIN.

PORCH. (It. *atrio*; Span. *zaguan*; Fr. *porche*; Ger. *vorhof*.) The shelter (HOOD) of an entrance, either without or within a doorway. Its dimensions are sometimes regulated by the consideration of what space is required for the convenient opening of outer and inner doors. Numerous examples of a porch to a residence are given in KERR, *Gentleman's House*, 8vo, London, 1871, p. 158, with remarks as to its enclosure in regard to aspect. A carriage porch (PORTE COCHÈRE) has usually only sufficient projection for a carriage-way under it; but a more convenient one has also a pavement for pedestrians next the house; and a good light. An enlarged porch is a PORTICO, which may have two or more entrances under it (COLONNADE; PORTICO; PROPYLÆUM; VESTIBULE): PORTAL has been used as the framework to a doorway or gateway (FRONTISPIECE, PORTONE). Instances of the porch, from MSS. and the Liberate Rolls, are given in TURNER AND PARKER, *Dom. Arch.*, 8vo., Oxford, 1853, ii, 78. HUNT, *Tudor Arch.*, 4to., London, 1836, p. 82, notices that "when the fashion of building houses on quadrangular plans was discontinued, a porch of at least two stories, and sometimes the whole height of the building, succeeded the gate-house. Low porches had been used as entrances from inner courts from an early date, as at Cowdry."

At Djemilah in Algeria, the foundations of a church, before the time of Constantine, showed no porch to the door which was at the side; LENOIR, *Arch. Monast.*, 4to., Paris, 1856, i, 247. EUSEBIUS, describing a church at Tyre, *cir.* 313-22, notices side porches, and a square colonnaded court. BASILICA. ATRIUM. NARTHEX. ANTE-PORTICO. To the Eastern basilican churches, the VESTIBULUM magna formed a porch. ANTE-CHAPEL. "The doorway of the smaller temple at Aboo Simbel gives the only instance of a porch that we saw in either Egypt or Nubia", writes A. B. EDWARDS, *Up the Nile*, etc., 8vo., 1877, ii, 431; but WILKINSON, *Ancient Egyptians*, gives several porches to Egyptian houses and villas. The octagonal tower of Andronicus Cyrrhestes, or that of the Winds, at Athens, has doors on two of its faces with porches, each consisting of two columns with foliaged capitals supporting an entablature and pediment. The villa of Diomedes at Pompeii, has a porch, formed by one detached column on each side of the doorway; an exceptional example. In Hindu temples, the *chaori* or *maha mantapa* precedes the *mantapa* or porch, which leads to the *antarala* or inner vestibule, and thence to the *vimana* or principal portion of the structure.

A Chat about Gateways and Porches, BUILDER *Journal*, 1873, xxxi, 58. *Illustrations*, pt. i, 1861; pt. i, 1863-5; *Timber porch* for cottages, BUILDING NEWS *Journal*, 1874, xxvii, 634. DALY, *Revue Générale*, 1844, v, 251-4; ix, 1851, 417-427.

The *porch to a church* was usually placed on the south side; out of eighty-seven parish churches noted, only three have a west porch; NOTES AND QUERIES *Journal*, 3 Ser. x, 16. It was often placed on the town side whether north or south. Fine examples of the Norman period exist at Malmesbury abbey church; Southwell collegiate church, Notts., north side; S. Margaret's church, York; Bishop Cheve church, Gloucestershire; Barnack church, Northamptonshire; and the GALILEE (often called a porch) at the west end of Durham cathedral. Of the earlier and middle pointed periods; at Wells cathedral, north, 1225-39 (*B. J.*, 1848, vi, 174-5); Ely cathedral, west end (*B. J.* 1847, v, 374); Lincoln cathedral, west side of south transept, it has entrances also in the sides; Salisbury cathedral north; and Peterborough cathedral, west, (which is sometimes called a PORTAL): Exeter cathedral, north; south transept at York cathedral; and north transept at Westminster abbey. Of the later period; at Redcliffe church, Bristol; S. Peter's church, and S. Michael's church, Oxford; Trinity church and King's College Chapel, Cambridge; at Taunton, Stamford, Thaxted, and Long Melford of 3 stories; at S. John Baptist church, Cirencester; S. Mary, Bury S. Edmund's; Beverley cathedral, north; Canterbury cathedral, south, 1420, which (*B. J.*, 1874, v, 134), much resembles that at Gloucester cathedral, also on the south: and Bolton abbey, Yorkshire, 1520, being the lower part of the unfinished west tower.

A *west porch* in other countries occurs at Lausanne cathedral, where it has a bench table or seat. At S. Benoît sur Loire, a large square two storey building, XII cent. (GAILHABAUD, *L'Architecture*, etc., 4to., Paris, 1858); at Clugny, *cir.* 1220, (both of these are given in DALY, *Revue Générale*, 4to., Paris, 1856, xiv, 60, pl. 1); and at Vezelay, *cir.*, 1150.

As regards the *use*, in ancient times, of a porch, or portal as sometimes called, attached to ecclesiastical edifices, occurs the custom of 'pleadings at the gate' (JOHNES, in *Joinville's Memoirs*, Diss. ii.); for the CONSISTORY COURT; and many other purposes, as for christenings, numerous instances of which are stated in *Stones of the Temple; the Porch*, in CHURCH BUILDER *Journal*, 1863, p. 67 and 132: and WALCOTT, *Church, etc., arrangement*, 8vo., London, 1861. LENOIR, *Arch. Monastique*, 4to., Paris, 1852-56, gives a full description of the processional ritual used in the great porches, as at S. Benoît-sur-Loire, XII cent., Clugny *cir.* 1220, and Vezelay, *cir.* 1150; especially on Palm Sunday; above the great Clugniac porches in France, a chapel of S. Michael was built; while VIOLLET LE DUC, *Dict.*, i, 185, 207, 259, admits the great difficulty of giving adequate explanation of their uses. A similar building at Sherborne abbey church, Dorsetshire, is described by CARPENTER, in Royal Inst. of British Architects, *Sessional Papers*, 1876-77, p. 140: and another at Lewes in Sussex. A galleried porch occurs at Snettisham church, Norfolk. At Malmesbury abbey church, the porch had a piscina perhaps used as a font; at Redcliffe church, Bristol, is a recess called a confessional; and at Grantham church, an altar. KERRICH, in ARCHÆOLOGIA, xvi. WHEWELL, *Architectural Notes*, 8vo., 1842, p. 123. The three porches or entrances to S. Mark's at Venice are said to be made the central for the clergy, the northern for women, and the southern for the men.

Over the porch there was often a room formed, the true purport of which, if there were only one, is still undecided. In England it is usually called a *parvise* (PARADISUS). This chamber is found in all parts of England; probably the largest is at Bishop's Cleeve church, near Cheltenham. At S. Mary's church, Sherborne, of Norman date but altered, there is a *fire-place;* also in the earlier of the two at S. Mary Redcliffe church, Bristol; at Pulham church, Dorsetshire: at Gissing church, Norfolk, the ejected rector, 1690, "dwelt in the north porch chamber"; at Westbury-on-Trim, Gloucestershire, is another. At S. Wulfram's church, Grantham, it has a library with about 250 chained volumes; S. Peter's in the east church, Oxford; south porch at Warwick church; S. Mary church, Finedon, has about 1,000 volumes. The *parvise* at Massingham church was used as a *school-room*, as at many other places; NOTES AND QUERIES *Journal*, 5 Ser., xi, 366; and xii; and 6 Ser., i, 437. At Wellingborough church there are *two* such chambers, one over each porch; and at S. Mary Redcliffe church, Bristol; S. James' church, Trowbridge, Wiltshire: a south porch with large chambers over occurs at Cirencester church. A *credence* and *piscina* are sometimes found in this chamber, as at Malmesbury abbey church; and at Leverington church, Somersetshire. CHURCH BUILDER *Journal*, 1863, p. 132; 1868, p. 20. BRANDON, *Analysis*, 4to., London, 1849. HUTCHINS, *Dorset*, fol., London, 1803, iii, 283. TAYLOR, *King's Lynn*, 4to., Lynn, 1844, p. 65. ANCHORAGE. PRIEST'S CHAMBER.

Angular porch at west front of Ratisbon cathedral, in BUILDER *Journal*, 1867, XXV, 610-1. At Erfurt cathedral is another porch with two central doors; another at end of south transept with flight of outside steps; SHAW, *Arch. Sketches*, fol., London, 1858, pl. 64-5.

A good porch at Lutenbach; GOLBERRY, *Antiquités d'Alsace*, fol., Paris, 1826-8, p. 63; pl. 24.

At Candes in France, it is like a chapter house, having a central shaft; *Handbook*, 205. S. Michael's, Caen; S. Vincent, Rouen; Chartres cathedral at side, XIII cent., 8 pl.; and that to S. George's at Cologne, XIV cent., 2 pl., are both given in GAILHABAUD, *L'Architecture du Vme, etc.*, 4to., Paris, 1858.

ITALIAN ARCHITECTURE (p. 49) notices the peculiar Italian porches having the columns standing on animals. LION. Several are shown in STREET, *Brick and Marble Architecture*, 8vo., London, 1855.

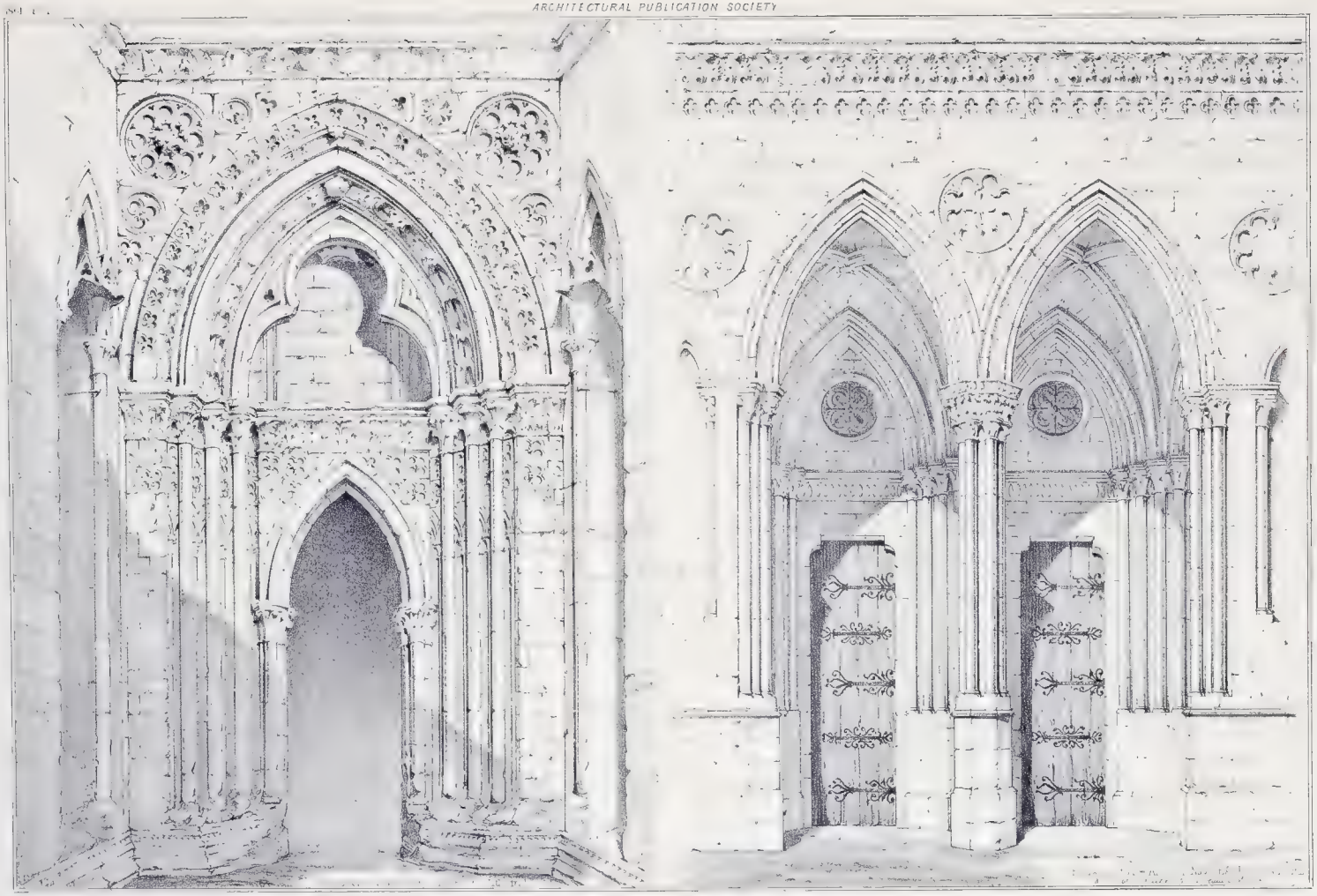
Brick, north porch; at Lubeck, CHURCH BUILDER *Journal*, 1863, iii, 53: SCHLÖSSER, etc., *Denkmale*, fol., Lübeck, (1831-32).

PORCUPINE WOOD; see PALMYRA WOOD.

PORDEN. A tombstone in Highgate cemetery is inscribed "In memory of Charles Edgar Porden, son of Charles and E. Porden, who departed this life June 25th, 1859, aged 16 years. Also in memory of Charles Porden of London, architect, son of Isaac Porden, architect, nephew of William Porden, architect to king George IV, and grandson of Roger Pourden of York, architect, who died March 6th, 1863, aged 73"; CANSICK, *Coll. of Epitaphs*, 8vo., London, 1869-72, p. 85.

This WILLIAM, a native of Hull, was born about 1755, and became a pupil of S. P. Cockerell. He designed 1790 stables and new farmyard at Aldwark; and 1792, the dairy there; 1794, villa in Putney park, Roehampton, Surrey, for Beilby Thompson, esq. (RICHARDSON, *Vit. Brit.*, fol., London, 1802, i, pl. 21-2. BUILDER *Journal*, 1876, xxxiv, 969); 1795, house in Gothic style for R. T. Gordon, esq.; and one in Sussex for W. Breton, esq.; 1797, Owston, near Doncaster, Yorkshire; chapel in Windsor forest; west front of Osborne House, Isle of Wight; South Kelsey church, Lincolnshire; 1798, alterations of Swainston, Isle of Wight, for Sir John Barrington; Hampton Lodge, for N. Snell, esq.; 1802, market on the estate of earl of Darnley, near Fitzroy square; 1804-12, Eaton hall, Cheshire, seat of earl Grosvenor; 1805, house for Mrs. Fitzherbert at Brighton; stables, riding-house, and tennis court, at Brighton, for H.R.H. the prince of Wales (to whom he was appointed architect; BRAYLEY AND NASH, *Illustrations*, fol., London, 1838, p. 2; 16; the works cost £70,000 from 1803); 1806, west front of the pavilion; and 1807, entrance hall; 1808, Broom hall, Fifeshire, for the earl of Elgin; 1809 and 1813, Ecclestone church, near Chester. The staircase at Taymouth castle, Perthshire, is given in section from a drawing by A. Murray, in BUILDING NEWS *Journal*, 1862, ix, 180. His design in competition 1805 for Downing college, Cambridge, in 21 sheets, is in the library of the Royal Inst. of Brit. Archts.

His works at Eaton hall covered the house erected by Sir J. Vanbrugh; he was assisted by J. Kay; and later by Benj. Gummow (who erected the wings 1823-25); 1845-53, it was repaired and altered by W. Burn; and of late years by A. Waterhouse, R.A. BUCKLER, *Eaton Hall*, fol., 1826. NEALE, *Seats, etc.*, 4to., 1818. ACKERMANN, *Repository of Arts*, 8vo., 1823, 3 ser., ii, 188. BRITTON, *Toddington*, 4to., 1840, p. 19. TWYCROSS, *Principal Seats*, 4to., 1847-50, iv, 1. BROOKE, *Gardens of England*, fol., 1858.





T. H. Watson, M. & I. B. A.

Lithographed for the Society by Kell Bros. Holy. 1856

The later works, BUILDER *Journal*, 1853, x, 595; east front, BUILDING NEWS *Journal*, 1860, vi, 751; 755. He died Sept. 14, 1822, aged about 67, and was buried, with his wife Mary who died 1819, in S. John's Wood chapel.

PORDEN (CHARLES FERDINAND), born 1790; was the son of Isaac Porden of Birmingham, architect; and was articled to his uncle WILLIAM: he was 1810 in the office of G. Wyatt; gained 1806 a gold medal, and 1809 a silver medal, of the Society of Arts, etc.: etched some of the plates in PYNE, *Royal Residences*, 4to., London, 1819: 1819-22 conducted the building of S. Pancras church for Messrs. Inwood: designed 1822-24 S. Matthew's church at Brixton, the specification for which is in Sir John Soane's museum; LOUDON, *Arch. Mag.*, 8vo., 1836, iii, 499: the almshouses at Whitchurch; and was for ten years in the office of Sir W. Tite, during the erection of the Royal Exchange. He died 6 March 1863, aged 73 years, and was buried at Highgate as above mentioned.

PORE or PUR; see POOR.

POREBUNDER STONE; see NUMMULITE.

PORFIDO; see PORPHYRY.

PORINOS; see CALLAISCHROS.

POROSITY. That condition of material bodies which consists in the discontinuity of their molecules, the intervals between these being called pores. Water in a hydrostatic or Bramah press, when very forcibly compressed, makes its way through the thick cast-iron cylinder by a sort of perspiration. This was also proved to be the case in the endeavour to launch the Great Eastern steam ship. The process of endosmose and exosmose has been shown to be constant with gas mains, as cast-iron is of a porous and cellular texture; and hence the loss of gas is found to be very great. SIMPSON and others, in discussion on CROLL, *Coal Gas, etc.*, read at Institution of Civil Engineers, 1845; and given in CIVIL ENGINEER, ETC., *Journal*, viii, 175-6. BOYLE, *Experiments—about the Porosity of Bodies*, 8vo., London, 1684. Oxidation would to a certain extent close the pores of metal; if a solution of sal ammoniac be forced into the metal it would be effectually oxidised. ENDOSMOSE. HYDROSTATICS. IMPERVIOUS. PERMEABILITY. WATER-PROOFING. 14.

PORPHYRY (from Gr. *πορφύρα*, purple). This term was originally applied to a reddish igneous rock found in Upper Egypt and used for sculptural purposes. Geologists now employ it to denote any rock (whatever its colour), which contains embedded crystals distinct from the main mass or matrix, as felspar porphyry, claystone porphyry, porphyritic granite, and porphyritic greenstone; PAGE, *Advanced Text-book of Geology*, 8vo., Edinb., 1857. It is capable of receiving and retaining a high polish, and though not so fine as many of the ordinary marbles, exceeds them in hardness. The art of cutting porphyry, as practised by the ancients, appears now to be unknown. A cubic foot of green porphyry weighs 230 lbs., and red 196 lbs.; other weights are given in Exhibition in London 1862, Swedish catalogue. The best known are: *porfido rosso*, deep red with oblong white spots; *porfido nero*, black with oblong white spots; *serpentino nero antico*, black with great oblong white spots; *serpentino antico verde*, green with oblong spots of a lighter shade; *porfido verde*, very dark, almost black, with fine grass-green shades; found near Ostia; *porfido di Vitelli*, pea-green with small bright crystal spots of light green. The *red* antique porphyry of Egypt; the *green* antique ophyte porphyry; the *blue* porphyry which the Romans found near Fréjus in some column shafts. The *red lead* coloured porphyry of Minorca. A case of fifteen distinct varieties of porphyry, from the royal quarries at Elfdal in Sweden, were deposited 1853 in the Crystal palace at Sydenham. Numerous works of art in this material, in the Vatican museum at Rome, are described in the *Handbook*.

FERBER, *Minéralogie de l'Italie*, 8vo., Strasb., 1776, p. 337-43. BRARD, *Descr. Hist.*, 8vo., Paris, 1833, p. 47. BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 205-18. WILKINSON, *Arch. of Ancient Egypt*, 8vo., London, 1850, p. 45; and *Handbook*, 270; 417. Exhibition of Industry of All Nations 1851, *Illustrated Catalogue*, and *Jurors' Reports*. BUILDER *Journal*, 1851, ix, 588-9; and PAPWORTH, in *Sessional Papers*, Roy. Inst. of Brit. Architects, Nov. and Dec. 1851. 1. 2. 6. 14. 25.

BELL, *The Art treatment of Granitic Surfaces*, read at SOCIETY OF ARTS, *Journal*, 1860; and CIVIL ENGINEER, ETC., *Journal*, xxiii, 143. *Porphyre; son emploi dans la construction du tombeau de Napoléon aux Invalides*, in DALY, *Revue Générale*, 1849, viii, 83.

PORPORINO. A composition of quicksilver, tin, and sulphur, which produced a yellow metallic powder, that was employed instead of gold by the mediæval artists when they wished to economise. FAIRHOLT, *Dict. of Terms*.

PORPORINO MARMOR. The Italian for, and see, PURPLE MARBLE; and PORPHYRY.

PORRATU (magister JACOBUS) de Cumis fecit hanc portam; an inscription of 1274 placed over the great entrance of the cathedral at Cremona; CICOGNARA, *Scultura*, fol., Ven., 1818, i, 318. It is also written Giacinto Porata, and Giacomo Porrata; and the last word as 'rotam', in VAIRANI, No. 141; and GRASSELLI, *Abecedario—Cremonesi*, 8vo., Mil., 1827, p. 211.

PORSGRUND TIMBER, from Norway; see LONGSUND.

PORTA. The Latin for a gate or entrance in a church, of which there were several sorts. Porta sancta, or regia, the door in the cancellum between the bema and the choir; porta regia (porta speciosa of RAMÉE), between the choir and the nave: porta speciosa or basilicæ, between the nave and narthex, of the modern Greek church; the modern "angelic gate" and the "beautiful", between the narthex and the porch. NEALE, *Holy Eastern church*, 5 vols., 8vo., London, 1850-73. LIVY, xxviii, 6, says: "fores portæ objicerent", in accordance with the fact that "porta", instead of meaning a door, like the modern words of similar sound, seems always to have been reserved for the gateway of a city or a camp. "Antica porta", or front door, VARRO. Ostium, aditus, and egressus, appear to answer to the English word doorway; CICERO, *Orat. post Red.*, 6, uses "pseudothyrum" for a back door. FORIS. The *porta* to the walls of cities of an early Greek period is exhibited in the restoration of the double gate at Pæstum, by DONALDSON, in FALKENER, *Museum*, 8vo., London, 1855, i, 37: and of the Roman period, in the ruins of Herculaneum and Pompeii, in LIBRARY OF ENTERTAINING KNOWLEDGE, 1831, i, 72, 83; and those of Rome; PARKER, *Walls*, 1876.

PORTA (GIROLAMO DELLA), detto il Novarino, was nominated 22 July 1512 assistant to Omodeo on the works at Milan cathedral, and so continued till 1527. GIACOBINO DELLA PORTA was about 1600 also at work thereon. 27.

PORTA (GIACOMO DELLA), of Portez in the Milanese, (LOMAZZO, *Trattato*, 4to., Mil., 1585, p. 690) worked under C. Solari il Gubbio as a stuccoist, then studied under G. Barozzi, and practised at Rome chiefly for pope Gregory XIII (1572-85). He built after the design of Buonarroti (TITO) the capella della Madonna, or capella Gregoriana, in S. Peter's church (LET., 617, pl. 304): completed also after his design, after 1564, the capella Sforza in the basilica of Sta. Maria Maggiore; 1563-4, designed the façade and completed the interior of Sta. Caterina de' Funari, (RUBEIS, pl. 68; LET., 151, pl. 5; TITO): continued the chiesa del Gesù after the death of Barozzi in 1573, from the cornice, with the cupola, the high altar, and the two round chapels of the Madonna and of S. Francesco d'Assisi, and the façade; the other buildings are by G. Rainaldi (RUBEIS, pl. 20-2): 1579 the chiesa di Madonna de' Monti Santi (LET., 168; pl. 27; RUBEIS, pl. 71; ROSSI, iii, pl. 20); the adjoining edifice and the collegio de' Neofiti are by G. Vecchi: and continued the Campidoglio after the design of Buonarroti, erecting the first story and the doorway (upper part by G. Rainaldi); the *perron* and its fountain; and the statues on the balustrade (FERRERIO, pl. 51; LET., 726-7, pl. 352-3; FALDA, i, pl. 17); in 1858 Calderari restored the edifice for the Roman municipality.

About 1583 Porta was appointed by pope Sixtus V (1585-90) architect to S. Peter's, with D. Fontana as his assistant, and raised 15 July 1588 to 14 May 1590 the dome, and the lantern 16 Aug. 1590, after Buonarroti's design, but giving to the dome

a little more height (Bonanni, *Templum Vaticani*, fol., Rome 1696, p. 93-9; pl. 24-6); adorned the interior with mosaics, designed the marble pavement finished by Bernini; 1592-4, designed the crypt (Bonanni, p. 154); and the decoration of the capella del coro: and (1592-1605) designed the capella Clementina therein: 1588, continued the basilica of S. Giovanni de' Fiorentini, in strada Giulia, begun by A. (Piccoui) da San Gallo (Let., 541, pl. 255; Vasari, *Lives*, 1851-2, iv, 7; v, 329); C. Maderno decorated the choir, and the façade 1725-34 was by A. Galilei: 1589, the façade and doorway of S. Luigi de' Francesi (Tito; Rubeis, pl. 39; Rossi, ii, pl. 6): completed the church of Sta. Maria Scala Cœli, begun 1582 by Barozzi (Rossi, iii, pl. 34); and 1590, designed the chiesa S. Paolo alle tre Fontane adjoining it (Tito; Let., 698, pl. 339); 1599, the façade of S. Pietro, or S. Nicolo in Carcere (Tito): 1600, enlarged the transepts and side aisles of S. Giovanni Laterano (Let., 476, pl. 223); and designed therein the capella Massimi, the third on the right (Let., 485, pl. 224): the chiesa di S. Anastasio de' Greci, strada del Babbuino (Rubeis, pl. 62; Falda, iii, 19), the portico is by M. Lunghi: the façade of S. Giuseppe sopra le carcere Tertuliane (Rossi, iii, pl. 21): the façade or church of Sta. Maria in Via: the high altar in the church of the Madonna dell' Orto in Trastevere; the magnificent tomb to card. Alessandrino, near the side door in Sta. Maria sopra Minerva; that of cav. Pucci of Florence; and the capella therein of signori Aldobrandini (Tito).

In 1526 he designed the palazzo A. Chisi or Chigi, afterwards Niccolini, and Aldobrandini, in piazza Colonna; continued by C. Maderno, and completed about 1630 by F. della Greca; (Ferrerio, pl. 56; Falda, *Pal. Rom.*, fol., Nur., 1694, iii, pl. 21): commenced the pal. Giustini ora Spada, in the Corso, opposite the Antonine column, since deformed: pal. Gottofredi, in piazza di Venetia: one half of the pal. marchese Serlupi next the seminario Romano, rione di Colonna, (Ferrerio, pl. 98): pal. di sig. Cornari alla fonte di Trevi: pal. del marchese Drago alla Ciambella: pal. sig. Muti with the *ringhiera* in piazza di Campidoglio: the grand hall and *ringhiera* of the collegio Clementino: pal. sig. Capozucchi a Campitello: pal. sig. Fano a Campidoglio, near where G. della Porta lived: 1575-76 works at the fabrica or palazzo, or collegio, della Sapienza, begun by Buonarroti (Ferrerio, pl. 33; Falda, *Pal. Rom.*, iii, pl. 22; Q. de Quincy, *Vie*, p. 354 says the cortile; Let., 212-4, pl. 70, says the portico of the court and principal façade); the church is by Borromini: 1575-89 the upper windows with the loggia towards the strada Giulia, of the pal. Farnese, commenced by Barozzi, (Ferrerio, pl. 5; Let., 274, 295; pl. 115, 124); and the following palaces:—Marescotti; Maffei alla Ciambella; de' sig. Crescenzi, near the Roman seminary: cardinale d'Este, in rione della Pigna (Ferrerio, pl. 63; Blondel, *Cours*, 8vo., Paris, 1772, iij, 424, pl. 62); sig. Mattei alle quattro Fontane; de' sig. Ruggieri nella strada diritta del Gesù; de' sig. duca Muti, strada del Gesù, rione della Pigna (Ferrerio, pl. 95); Boadile, via de' Cesarini, called on Nolli's plan, della comp. del Salvatore ad Sancta Sanctorum (attributed to Porta, by Let., 196, pl. 56); the interior of the palazzo marchese Paluzzi d'Albertoni in rione di Campitelli, (Ferrerio, pl. 81; Falda, *Pal. Rom.*, iii, pl. 1), the outer door by G. Rainaldi; and about 1598, the villa Borghesi-Aldobrandini at Frascati, called the Belvedere, completed by G. Fontana; the date 1603 is on the fountain "sopra il viale de cipressi" by Porta, given in Falda, *Fontane*, pl. 77; (Percier et Fontaine, *Maisons de Plaisance de Rome*, fol., Paris, 1824, pl. 64-6): and the trophies of Marius and Trajan; and the miliary column.

Fountains.—With the tritons in the Piazza Navona (Falda, pl. 30; Let., 513, pl. 231); in piazza Colonna (pl. 17); in piazza della Rotondo (pl. 19); in piazza degli Giudeá (pl. 20); for sig. Muti nella piazza, sotto Campidoglio (pl. 16); in piazza della Madonna de' Monti (pl. 24); in front of the portone degli Ebrei; in piazza del Popolo; that within the Campidoglio in which is the statue of Marforio; and 1585 with tritons "delle Tartarughe", in piazza de' Funari or Mattei now delle Tartarughe; the figures by T. Landini, (pl. 21; Let., 398, pl. 187; Falda, *Fontane di Roma*, fol., Rome, (1675). Taken ill at the porta S. Giovanni Laterano, at Rome, Porta died there in 1601 (*Handbook*), or 1604 (68) aged 65.

Tito, *Ammaestramento*, 12mo., Rome, 1686. Ferrerio and Falda, *Palazzi di Roma*, fol., Rome, (1655). Rubeis, *Insignium Romæ Templ.*, fol., Rome, 1684. Rossi, *Nuovo Splendore*, fol., Rome, 1686-8. Letarouilly, *Rome Moderne*, fol., Paris, 1825-40-60. 3. 34. 37. 38. 68. 113.

PORTA (Giovan Giacomo, or Jacomo della). A disciple of Crist. Solari il Gobbo, was appointed 23 May 1524 sculptor and architect at the duomo at Milan, executed many works at the certosa at Pavia, especially the tomb of the counts of Virtù in front of the church. In 1531 he went to Genoa to erect the sepulchre, and modernise the chapel, of S. Giovanni Battista in the cathedral; and 1537 restored the church of Sta. Annunziata del Guastato with D. Scorticone; Gauthier, *Genoa*, fol., Paris, 1830, i, pl. 85-7, p. 12. He also executed the mausoleum of pope Paul III, advised by Buonarroti. Guglielmo, a son or nephew, worked with him. 38. 73.

PORTA (Giuseppe), detto Salviati, under whom he studied painting, was born 1535; decorated with paintings a large number of Venetian buildings, and died about 1585. Marcolini published his rules for describing the Ionic volute, fol., Venice, 1552; in Latin by Poleni, *Exercitationibus Vitruvianæ*, 4to., Utini, 1825-30; and by Selva, *Maniere*, etc., fol., Padua, 1814. Vasari, *Lives*, edit. 1852, v, 161. 68.

PORTA, or Porto, an Italian, designed 1799 for the emperor Paul at S. Petersburg, the imperial medico-chirurgical academy; a spacious area around three sides of a square for 340 students. Granville, *S. Peters.*, 8vo., London, 1835, ii, 266.

PORTABLE BUILDING. One so arranged as to be easily put up, taken down, and re-erected. An early instance is described in the *Register of Arts*, and copied in Stuart, *Dict. of Architecture*, 8vo., London, (1832), s. v. House.

Samuel Hemming's patent improved portable buildings, adapted to all climates, are shewn in Builder *Journal*, 1854, xii, Jany. 14, advertisements.

PORTABLE OR PONTIFICAL ALTAR. A small tablet, serving for the consecration of the elements away from a proper altar in a church. One of silver was found 1827 in the coffin with the body of S. Cuthbert when his grave was opened. A licence from the pope was necessary to entitle any one to have a portable altar; that granted by pope Eugenius IV (1431-47) to the prior of Coldingham, is printed in Surtees Society, *Historiæ Dunelmensis Scriptores tres*, cclxvi. One of xiii cent. of oriental jasper enclosed in silver, 12 ins by 7½ ins, is figured in Archæological Journal, 1847, iv, 245; and Parker, *Glossary of Arch.* 1850, p. 19. Bingham, *Origines*, ii, 455. A bull 1417 of pope Martin V, granted 1417 to the staple merchants in London, the privilege of having a portable altar and a priest, as given in Weever, *Funeral Monts.*, etc., 4to., London, 1631, p. 340.

PORTAIL. A French term, used by English writers. It generally includes the chief façade of a building having the entrance in it—(Daly, *Revue Générale*, 1841, ii, 274, 452; iii, 313; v, 250, 286, 422; vi, 145; ix, 115; x, 234, 239), though it is sometimes applied to the entrance or frontispiece only. The French writers also apply the term to the pylons, of Egypt, and to the propylæum, of Greece. 1. 25. 41.

PORTAL. A small entrance doorway; the lesser doorway to a gateway tower. In a note to Stuart and Revett, *Antiq. of Athens*, fol., London, 1762, i, 37, s. v. Stoa at Athens, it is suggested that this term portal "will best express the piece of architecture so frequently placed before the door or entrance and generally called a portico". The term is often applied to the large porches in front of cathedrals, as at Peterborough, Vezelay, etc.; and also to the projecting building in front of some continental edifices, more properly perron. Burges, *Portals of France*, etc., in Builder *Journal*, 1860, xviii, 171-2; and

BUILDING NEWS *Journal*, vi, 190-1, describes the best examples, the decoration, and symbolism, of the great entrance doorways. FRONTISPIECE. PORCH. VESTIBULUM.

It seems to have been formerly applied to a small lobby in a room, separated from the rest of the apartment by wainscotting; as s. v. PARTITION: "1525 item paide to Rowland the joyner for iij days worck of the portall in the parlar, xxjd. Itm, paid to Thomas Randon for the iron work of the portall, iijs. jd"; GAYE, *Hengrave*, 4to., London, 1822, p. 47.

PORTA SANTA BRECCIA or Marmor Jassense. A rare marble, obtained in Tuscany, taking its name from being used for the jambs and lintel to the northernmost (and usually closed up) of the five entrance doors to a gateway to S. Peter's at Rome. It is red and white in colour. There are four columns of it in the nave of the church of S. Agnese fuori le mura; four others in the basilica of S. Sebastian; those in the altar of the Presentation in S. Peter's, and the basin of the fountain in the piazza Colonna, all at Rome. The porta santa breccia fiorita is white and gray, bluish, with purplish spots. CLARAC, *Musée du Louvre*, 8vo., Paris, 1841. CORSI, *Pietre Antiche*, 2nd edit., 8vo., Rome, 1853. HEAD, *Rome*, 8vo., Lond., 1849, i, 491. 28.

PORTCULLIS (Lat. *cataracta* in LIVY; low Lat. *collisa portam*; It. *rastretto*; *saracinesca*; Sp. *rastrillo*; Fr. *porte coulisse*; Ger. *fallthur*) formerly called *herse* or *herce* and *sarrasin*. A strong grated frame of timber, made to slide up and down in a groove (Fr. *coulisse*) formed in each side of the stonework of the gateway in mediæval castles. It was used by the Romans at an early age (DENNIS, *Etruria*, ii, 275, mentions grooves in a gateway at Cosa and at Volterra), and later from the Norman period. The lower ends of the vertical frame were shod with iron to strike into the ground when let down, or to pierce and crush anything on to which it might fall. The gates to the "Bloody tower" in the Tower of London are genuine, and the portcullis is said to be the only one remaining in England fit for use.—GROSE, *Antiq.*, etc., 4to., London, 1784, i, 11. CULLIS. 1. 19.

The portcullis was the cognizance of the illegitimate branch of Beaufort, and was borne by the house of Lancaster; so king Henry VII adopted it among the emblems of the crown. It is also borne by the city of Westminster, with the arms attributed to king Edward the confessor.

PORTE COCHERE. The French term, used by English writers, to express the carriage way entrance to a house, where the court is sufficiently large for the carriages to pass through it and draw up in the court. The smallest width is 7½ feet. Examples in London existed until lately, at the British Museum, and Burlington House; and still at Harcourt House, Cavendish Square. FRANCARD, *Portes cochères de Menuiserie*, cir. 1680-5. KRAFFT, *Portes cochères, etc., de Paris*, 50 pl., 4to., Paris, 1810; 1820; with supp. pl., 1838.

PORTELL (BERENGARIO), *lapicida*, of Gerona, carved 1325 the columns in the cloister of the cathedral of Vique; those in the cloister at Ripoll are also attributed to him. STREET, *Spain*, 1865. 66.

PORTER'S LODGE. Apartments for the keeper of the external door of an important building. In a military gateway, the porter's lodge is sufficiently large to accommodate a guard of soldiers, and built with loopholed projecting bastions to protect the gate from damage. In the middle ages, the machinery for working the PORTCULLIS was placed in an upper room of the porter's lodge. In a civil building, it should have a barred bay window projecting beyond the face of the outer door, or a grille inserted in the door, level with the eye, so that when the door is closed, the porter can, through the window, or grille, inspect and parley with every comer before opening the door. In places of detention, depositories of valuables, etc., it is customary for the outer door to open into a hall of the porter's lodge which is provided with an iron gate in the middle, and a door opening into the interior of the building, so as to guard against surprise by having only one of the three opened at one time. R. R. R.

PORTER'S ROOM. In some large houses, a porter's room is required in connection with the entrance hall, and near the outer door. This may also serve as a servants' waiting room.

PORTER (JOHN), mason, while residing in Lincoln, was 1450 sent for to York by the chapter, who wished to avail themselves of his experience: he returned to Lincoln, but in a few years became established at York cathedral, as in 1456, as master of the masons, an office he held until 1466 when he was succeeded by Robert Spillesby. SURTEES SOCIETY, *York Fabric Rolls*, 8vo., Durham, 1859.

PORT HOLE. An opening or window of an oval shape, as in a pediment, a gable, or a dome (WREN, *Parentalia*, 310). EYE.

PORTICO (Lat. *porticus*). A prostyle or assemblage of columns at the entrance to an edifice, either forming the entire façade, or the principal feature in the general composition. PRONAOS. POSTICUM. A circular projecting portico was called CYRTOSTYLE. In France, the purpose is understood by the word PERISTYLE, as applied to the porticoes or colonnade in front of the old Louvre, and the church of S. Sulpice, although this latter is quite as frequently called *porche*. The Egyptian portico is criticised in FREEMAN, *History of Arch.*, 8vo., London, 1849, p. 67-8; referring to *Egyptian Antiquities*, i, 101. A portico to an Etruscan house is noticed in DENNIS, *Etruria*, 8vo., London, 1848, i, lxii, 255, 418: to tombs, 130-1, 157, 249, 257, 491-3; and arcœostyle, 255. At Pompeii, to the large villas, a portico was placed along one side of an entrance court, or on three sides of it. (MOSQUE.) In the House of Pansa, the portico or colonnade facing the garden in the rear was of two stories. To the ordinary houses there was only a PORCH to the front entrance. PORTAL. PROSTASIS.

A. W. HAKEWILL, *Remarks on Antient and Modern Porticos*, in CIVIL ENGINEER, *etc., Journal*, 1840, iii, 293-6. A *Table of Porticoes*, 39 in number, is given in PENNY CYCLOPÆDIA, s. v.; reprinted in C.E. *Journal*, iii, 389: the British Museum, vi, 376; the Parthenon, iv, 16; the Pantheon, etc., at Paris, iv, 23. LEEDS, in BRAYLEY AND BRITTON, *Public Edifices*, Supp., 8vo., London, 1838, p. 44, 80-2. LEEDS, *Essay on the Application and Treatment of Porticoes in modern Buildings*, read before Liverpool Architectural Society, printed in C. E. *etc., Journal*, 1853, xvi, 210-5. 1. 2. 3. 6. 7. 14. 19. 25.

The portico or vestibule behind the *scena* of the ancient Greek theatre was called CHORAGIUM.

Alexandria, Antioch, Palmyra, Seleucia, Laodicea, and Nicea, were laid out with streets at right angles to each other, usually having porticoes or colonnades at the sides, as at Palmyra, Pella, Antioch, Pompeiopolis in Cicilia, and Gerasa, in Syria; and Antinopolis in Egypt; (FALKENER, *Museum of Classical Antiquities*, 8vo., London, 1860, ii, 280).

The fine ARCADED PORTICO to the church of the Madonna della Grazie at Arezzo, *cir.* 1475 by B. da Majano, is given in LECLÈRE. *Recueil*, fol., Paris, 1826; pl. 41. There are also good examples of street porticoes in BOLOGNA (p. 105), and in those outside the walls, degli Scalzi 1700 ft. long, and di S. Luca, little less than 3 miles in length.

PORTICUS. This Latin word occurs several times in BEDE, ALCUIN, HEDDIUS, and other ancient Saxon writers, and is generally translated "porch", thus misleading with the terms ATRIUM or VESTIBULUM, or outside the church; whereas it truly meant inside, and probably an aile; BENTHAM, *Essay*, 8vo., London, 1800, p. 26-31.

The porticus forming a gallery of sculpture and painting, was much in vogue at Rome; Nero had three in his palaces, each being 300 paces long. The library founded by Hadrian was placed in a porticus, adorned with pictures, statues, and a roof of alabaster, and supported by 100 columns of Phrygian marble: GIBBON, *Decline*, chap. 40. The Roman porticus (Gr. *stoa* when on the flank of a building) was for promenade only. It was used by the Stoics, was planted with trees and decorated with statues. The porticus built by Metellus Macedonicus, near the theatre of Marcellus, was the first marble building in Rome

and enlarged and embellished by Augustus; two temples were comprised within it, designed by Sauros and Batrachus, Spartans. The architects of the porticus of Octavia built on its site were also Spartans; it was a parallelogram with a double row of 250 or 270 Corinthian columns of white marble, with statues and paintings; it enclosed an open space in which stood a temple to Juno and another to Jupiter, and a library, as shown in the Capitoline plan, engraved by BELLORI; being burnt in the reign of Titus, it was restored by Sep. Severus, and Caracalla; BURGESS, *Theatres and Porticoes of Ancient Rome*, read at Royal Inst. of Brit. Architects, 1848; reprinted in CIVIL ENGINEER, ETC., *Journal*, xi, 233-6. Porticus of Pompey, is given in SERLIO, *Archit.*, fol., Venice, 1663, p. 166-7. Porticus of Philippus with the theatre of Balbus, are to be traced at No. 23 via di S. Maria in Cacaberis, and under the palazzo Cenci. Porticus of Diocletian at Palmyra, in CASSAS, *Syrie*, fol., Paris, (1799), i, pl. 93.

The porticus of Augustus to the new agora at Athens; one of the latest examples of the Doric order, B.C. 20. (ATHENS.) The Porticus at Thoricus has a wide central intercolumniation on the flank; SOCIETY OF DILETTANTI, *Unedited Antiq.*, fol., London, 1817, p. 57. BRAUN, *Ruins, etc.*, 12mo., Bruns., 1854. DURAND, *Parallèle*, fol., Paris, 1801-9, pl. 15 and 18. AGORA. LESCHE. 28. 78.

PORTIGIANI (BARTOLOMMEO), afterwards fra Domenico, born 1536 at San Miniato or Florence, after studying the writings of Vitruvius and Alberti, restored and rebuilt many of the religious edifices at Florence and Fiesole; became an assistant to Giovanni da Bologna, and cast many fine works in bronze, as at Florence and Pisa. He died 5 Feb. 1601, aged 64. MARCHESE, *Lives*, 8vo., Dublin, 1852, ii, 282-96, correcting MORRONA, *Pisa Illust.*; CICOGNARA; BALDINUCCI; GORI; and RICHA.

PORTILLO (PEDRO), without the title of maestro, was appointed to succeed 1654 to J. de Aranda Salazar at the cathedral at Jaen, which he completed sufficiently for consecration and use in 1660. 66.

PORTLAND (NICHOLAS), mason, 1394 at Salisbury cathedral, perhaps designed and erected the arches to the four grand pillars. Robert Wayte was mason 1415. DODSWORTH, *Salisbury*, 4to., London, 1814, p. 158.

PORTLAND (Indian *Machigonne*). A seaport town and capital of Cumberland, Maine county, United States, incorporated 1786, and as a city 1832. The fire of 4th and 5th July 1866 destroyed about one-third of the city, including the business portion; since rebuilt. The city hall, one of the largest and best edifices, 150 ft. long, of olive coloured dressed freestone, with a dome 160 ft. in height, is by J. S. Rand of Boston; view in DUBLIN BUILDER *Journal*, 1861, iii, 557. The old custom house (fireproof) of hammered granite escaped the fire. The fine exchange (Ionic) was purchased for the new custom house. The post office is of white Vermont marble. RIPLEY AND DANA, *American Cycl.*, 1875. 50.

PORTLAND CEMENT. An artificial hydraulic cement, so called from its approximate resemblance to Portland stone. "*Pulham's* Portland stone cement" was commenced about 1821, as in 1845 it was stated to have stood the test of twenty-four years successfully. The parent of this cement was *Frost's* cement, which was made about the same time by mixing chalk and clay together, as in the present cement, though in different proportions, and manufactured in a different way. *Aspdin* patented a Portland cement in 1824, from which the present one descends. These with *Maude's* Portland cement are noted in BUILDER *Journal*, 1845, iii, 160, 275, 293; iv, 229; 435; 489. It was taken up before 1845 by J. B. *White* and sons, and formed by them of a mixture of chalk found on their land in Swanscombe parish, Kent, with the blue clay of the river Medway, as noted in PASLEY, *Limes, etc.*, 2nd edit., 8vo., London, 1847, pt. 1, p. xiii. "The proportion", which is not stated in Messrs. White's paper read at the Inst. of Civil Engineers, May 18, 1852, "is ground together in water, run off into backs or reservoirs, and after attaining a specific consistency, it was artificially dried, and then removed to a kiln for calcination, which operation is carried to a much greater extent than that needed for lime and Roman cement. It is next ground; and, after being sifted, is packed for use." By using a small quantity of water in the grinding, the drying is now often performed without the loss of time and fuel caused by the running into settling batches, and the subsequent evaporation of water. It is very important that the ingredients be mixed in proper proportions, for if too much lime be used, the cement will be liable to crack and blow; and if clay be in excess, the cement will be weak. For use it should be mixed with only a small quantity of water, as an excess is a cause of weakness. The bricks should be clean and be wetted before being laid. The sand should be clean, coarse, and sharp; but its addition lessens the strength of the cement. "Cement weighing 112 lbs. per imperial bushel, gauged neat and mixed with varying proportions of different kinds of sand, showed that neat cement was strongest; with an equal quantity of sand, it might be said to be, at the end of a year, about $\frac{3}{4}$ths of the strength of neat cement; and that with 2, 3, 4, and 5 parts of sand, the strength was respectively $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and about $\frac{1}{6}$ that of neat cement. At the end of twelve months neat cement kept under water in a quiescent state was about $\frac{1}{4}$ stronger than that which was out of water, both indoors and exposed to the weather. Salt water was as good for mixing as fresh water" (GRANT).

If rapid setting and great strength be not required, 3 to 4 parts of sand may be used. Even 1 cement to 8 of sand (1 part being founder's loam) has been successfully used (1880) at Chatham dockyard. If the cement be used directly it is burnt and ground, it frequently fails by expansion, and it therefore must be carefully air slacked, so as to effect the hydration of the lime; to secure this more effectually, the powder should be turned out of the casks or bags, and be exposed to dry air for some time after its delivery at the works. From a chemical point, Portland cement may be regarded as a double silicate of lime and alumina. An analysis of ordinary quality yields the following main ingredients:—Lime 60·05; Magnesia 1·77; Alumina 10·84; Silica 24·31; Alkalies, 1·54.

"The following clauses will most of them be found useful:—Portland cement.—The whole of the cement to be of the best quality of Portland cement; to weigh not less than 110 (or 112) lbs. to the imperial striked bushel; the measure to be filled from an inclined board at an angle of 45°, free from core and underburnt particles, ground so that 80 per cent. at least will pass through a sieve of 2,500 meshes to the square inch. The tensile strain to be ascertained after seven days in the usual way, and to be equivalent to 400 lb. per square inch of section on the neat cement. The contractor to supply a proper machine and moulding apparatus for the purpose of carrying out the necessary tests, and to furnish proper samples of each consignment of cement for the purpose of testing. To erect in the vicinity of the work a shed with a damp-proof floor, capable of containing the entire supply of cement for use on the job, for a period of seven days, in a layer of 12 in. in depth. To cause each sack or barrel of cement to be opened at least seven days before it is required, and its contents to be spread out in a thin uniform layer on the floor of the cement-shed.—Then should follow clauses referring to the washing of the sand, proportions, mode of mixing, etc.—GILBERT R. REDGRAVE." To which may be added "when tested with 3 parts of sand to have a minimum strength of 112 lbs. per square inch in twenty-eight days, one day being in the air and twenty-seven days in water." Portland cement if weighing 84 lbs. per cube foot; $26\frac{2}{3}$ cubic ft.=a ton. In a cask or barrel of 4 bushels=5 ft. 2 in. cube=4 cwt.; but it generally does not exceed $4\frac{1}{2}$ cube feet. In cementing work, the *rough coat* is usually formed of 1 cement to 3 of rough sand or shingle. *Fine coat*, of 1 cement to 3 of clean washed sand.

Portland cement should not be painted for a year, to allow it

thoroughly to dry; a coat of linseed-oil might be first applied; BUILDING NEWS *Journal*, 1874, xxvii, 476, 509; xxix, 494, 520. This material is most useful in lieu of lead for fixing ironwork in stone, thus preventing the usual oxidation of the metal. The rail ends should be made dovetailed, and a suitable cavity formed to prevent the metal touching the stone.

WHITE AND SONS, *Experiments on the Strength of Portland and Roman Cements*, 8vo., London, 1852. BURNELL, *Limes, Cements, etc.*, 12mo., 1857. GILLMORE, *Limes and Cements, etc.*, with experiments, 8vo., New York, 1863. GRANT, *Exper. on the Strength of Cement, chiefly in reference to the Portland Cement used in the Southern Main Drainage Works*, 8vo., London, 1875; the same subject was read at the Inst. of Civil Engineers, *Transactions*, Dec. 1865; printed in BUILDER *Journal*, xxiii, 911; and CIVIL ENGINEER, ETC., *Journal*, 1866, xxix, 7; another paper by GRANT in *Transactions*, 1871. REID, *Practical Treatise on the Manufacture of Portland Cement;* with translation of LIPOWITZ, on a new method adopted in Germany of manufacturing that cement, 8vo., London, 1868; reviewed in BUILDER *Journal*, xxvi, 793. COLSON, *Experiments on the P. C. used in the Portsmouth Dockyard Extension Works*, read at Inst. of Civil Engineers, *Proceedings*, 1874-5, xli, 125. MACLAY, *Testing Portland Cement*, in American Society of Engineers, *Transactions*, 1878, with Tables of data; and a conclusion contrary to that of Grant and of Colson. FAIJA, *On Portland Cement*, read at Royal Inst. of Brit. Architects, Feb. 1880. SCOTT AND REDGRAVE, *Manuf. and Testing of P. C.*, Inst. of Civil Engineers, *Proceedings*, 1879-80, May 11. Articles in the BUILDING NEWS *Journal*, 1880, from p. 505.

PLUMBE, *Architectural Treatment of Portland Cement*, B. N. *J.*, 1871, xx, 445.

PORTLAND CEMENT CONCRETE. The proportions of 9 parts of rubble to 1 of cement were used by Knight, Bevan, and Sturge, at Dover and Alderney; BUILDER *Journal*, xx, 525; and those of 12 to 1 were used at Chatham dockyard, by BERNAYS, *P. C. concrete, and some of its Applications*, read at Inst. of Civil Engineers, *Proceedings*, 1879-80, p. 25. LEBLANC, *On Portland Cement*, as used at the port of Boulogne, 1860, in CIVIL ENGINEER, ETC., *Journal*, 1866, xxix, 133-6. BOULT, *Notes on P. C. concrete*, read at the Liverpool Engineering Society, printed in the BRITISH ARCHITECT, ETC., *Journal*, 1878, ix, 43: also see 1880, p. 245.

PORTLAND STONE; see JAMAICA STONE.

PORTLAND STONE. An oolitic carbonate of lime with a few fragments of shells, procured from numerous quarries in the isle of Portland, on the south coast of Dorsetshire. It is whitish brown in colour; generally composed of more than 95 per cent. carbonate of lime, and rather more than 1 per cent. of silica and carbonate of magnesia. It absorbs more than $\frac{1}{7}$ of its bulk (about $6\frac{3}{4}$ pints of pure water per cubic foot). It can be obtained in blocks of any required size, and can be worked by the chisel or by the plate saw. CHILMARK STONE. HASELBURY QUARRY. OOLITE. PAVEMENT.

OLIVER, *Exeter Cathedral*, 1861, p. 186, notices its use there in 1304. Neither HOLINSHED, who wrote before 1574, nor CAMDEN, who died 1623, mention the stone quarries, although several buildings had been erected in the island, from the north eastern old quarries, now deserted. About 1600 this stone came into general use for superior buildings in London and the South of England; and Inigo Jones, having had to survey the crown lands there, became acquainted with the material, used it 1619 for his banqueting hall at Whitehall; 1631 for the portico to St. Paul's cathedral, etc. LANGLEY, *Builder's Assistant*, 8vo., London, 1738, p. 161, notices that the stone on the south side of St. Paul's cathedral was decayed $\frac{1}{16}$ of an inch.

A list of edifices in London in which this stone (and others) has been used, is given in BUILDER *Journal*, 1858, xvi, 632; and another in BUILDING NEWS *Journal*, 1867, xiv, 421.

A general plan of the chief quarries, with sections of three of them, are given by SMITH, *Lithology*, in *Transactions* of Inst. of British Architects, 4to., London, 1842, i, pt. 2, p. 159. The following are the several strata described by him.

Waycroft.	Grove, Redcroft.	Castle.	REMARKS ON THE STRATA.
Grass	Same	Same	
Blue clay	—	—	
Thin rubble	—	—	Used for rough pavements, slates, tiles, etc., in the island.
Dirt bed	—	—	Full of fossil roots, and branches, etc.
Top cap	—	—	White, hard, and closely compacted limestone; too hard for useful purposes.
Skull cap	—	-	Durable, useful for bold massive works; irregular in texture, but a well compacted limestone.
Flint	—	—	Incorporated with the freestone bed under it. Full of cavities.
Roach of the top bed		—	Useful. Tool marks in buildings of 1766 still apparent. (But full of large shells, and so wears unevenly.)
Top bed	-	Beds not so distinctly separable.	Best stone in the island.
Flint	—	—	
Thick rubble	Carf	—	Occurs only in the S. W. quarries on east cliff; soft to the north, and hard to the south.
Roach of the bottom bed	-	-	Totally unfit for external uses.
Bottom bed	—	-	Called 'best bed' from custom, that in the old east cliff quarries having been considered the best stone. Ill cemented and will not stand the weather.
Kimmeridge clay of great depth.			(See also PURBECK.)

"The stone even in the same quarries varies considerably; the best is in the north eastern part of the island; the worst in the south eastern part." "Glass veins", varying from a line to an inch or more in breadth, often run completely through a block; they are by no means perishable, neither do they facilitate decay. In steps or pavements, their hardness soon occasions them to be conspicuously above the general level. ABEL remarks, that "the differences indicated by analysis of twenty-eight samples are only of a trifling description, and not calculated to influence in any definite manner the comparative durability of the different varieties of stone"; and names the following, for *external work:* 1. War department quarry, Vern Hill: whit-bed, Admiralty quarry, 2. whit-bed, New Maggot quarry: base-bed, Admiralty quarry: whit-bed, Inmosthay quarry. 3. whit-bed, Old Maggot quarry. For *internal work:* base-bed, Old Maggot quarry IT; whit-bed, Independent quarry; base-bed, Waycroft quarry; base-bed, New Maggot quarry. The following are inferior to those just named: whit-bed, Waycroft quarry; base-bed, Old Maggot quarrel IE; base-bed, Inmosthay quarry." Best whit-bed, brown, white, and cream colour; and roach for sea-walls.

The term "whit bed" denotes the brown stone or top bed; "base bed" denotes the white stone or bottom bed. Both the top cap and skull cap are considered as waste, and are found above the roach, which is on the top of, and joined to, the Whit bed. The term "top bed" means the top bed of block stone quarried for the market. The term "block stone" is applied to both the whit and base beds to distinguish it from roach or cap. Whit bed is the better weather stone, and should always be used in external work; Base bed is only fit for internal use. The quality of the latter being finer than the former, it is much easier to work, and is therefore often used where it should not be, to save expense, although the first cost of the stone in the block is somewhat dearer. (Messrs. Freeman.)

Portland stone of the most durable quality is comparatively heavy, of a uniform colour, rather dark (or brown) owing to the quantity of cement, of a compact crystaline texture, regularly dispersed throughout the pores; and hence it will resist a greater force to crush it, or to disintegrate the particles. Where the 'roach' is quarried in the block the bed of the stone is easily discernible, although the 'bedding' is perhaps of not so much consequence as in other stones. "Bricks of neat *Portland cement*, after being made 3, 6, and 9 months, withstood a crushing force of 65, 92, and 102 tons respectively, or equal to the best quality of *Staffordshire blue bricks*. Those of cement mixed with 4 or 5

parts of sand bore a pressure equal to the *best picked stocks:* while *Portland stone* of a similar size bore on its bed 47 tons and against its bed something less; *Bramley Fall stone* sustained 93⅓ tons, and 54⅔ tons respectively" (GRANT).

Quarry and Proprietor.	Bed.	Weight per cub. ft. lbs. oz. dr	2 in. cubes, wt. sustained in crushing. lbs.	Remarks.	Where used.	Writer.
Waycroft	Top	135 8 12	...	Best stone in the island, though not always	Goldsmiths' hall; Reform club house,	Hunt.
(The Crown)		151 0 0	Hunt	the finest grained	etc.	C. H. Smith.
	Base	...	11836·7	Light coloured and uniform	. . ..	Abel.
	Whit	...	...	Rough in texture and porous	... ...	Abel.
Grove	Curf	145 9 9	...	... ...	... ...	Smith.
(Mrs. Bowles)	"Best" or lower bed	147 10 11	...	Stands the weather pretty well	... ...	Smith.
		135 to 147	...	... ...	... ...	Hunt.
Grove at Redcroft (Mr. Redcroft) and Bowers and Goslings			...	... ...	S. Paul's cath., and many London churches	Smith. Hunt.
W. H. P. Weston, private quarries			...	... ...	Somerset house; British Museum; Bridgewater house; Treasury; etc.	B. J., 1862, xx, 582.
Vern Street	Top	134 10 0	...	... ...	... ...	Smith.
Vern Hill, War Department	Roach	...	14795·8	Light coloured, very hard and compact: one of the heaviest stones of the series. Strength not uniform. Invaluable for external work, where very considerable strength and resistence to mechanical wear are required	... ...	Abel.
	Whit	...	...	Hard, light coloured, very compact; samples had some large cavities; numerous pin-hole cavities; and free from cavities. Highly valuable for external work of a similar kind to the above		Abel.
Castle (Messrs. Freeman)	Between the Flint beds	132 5 8	...	Decomposing quality	... ...	Smith.
		133 6 7	...	... ...	... ...	Smith.
King's Barrow, East End (The Crown)			...	... ...	Local buildings	Hunt.
Portland trade (Messrs. Freeman)			..	... ...	Largely for public buildings	Hunt.
Trade quarry	...	...	...	... ...	Weymouth, etc.	Hunt.
Goslings (The Crown)	Bottom	131 4 8) 132 5 7)		Decomposes rapidly	... ...	Smith.
	Roach	126 13 13	...	... ...	... .	Smith.
	Scull cap	110 1 0	...	... ...	. . ..	Smith.
Inmosthay	Whit	...	14591·8	Fine grained, moderately compact, almost destitute of shells	... ...	Abel.
	Base	...	...	Considerable want of uniformity ...	. . ..	Abel.
Admiralty	Rough Whit		14387·7	Rough but compact, contains shells and cavities	... ...	Abel.
	Whit	...	13979·5			
	Base	...	13775·0	Light coloured, compact and very uniform. More indications of shells than any other Base bed stones; and in appearance and properties, very similar to Whit-bed stone	... . .	Abel.
New Maggot (The Crown)	Whit	...	12857·1	Light coloured, compact, and very uniform.		Abel.
	Base			Very uniform, but porous	... .	Abel.
Old Maggot	LI Whit	...	12244·8			
	IT Base	..	12857·1	Uniform; some shewing faint bands of stratification ...	. . ..	Abel.
	LI Base	...	8163·2	Lowest quality of Base bed-stone examined; very soft and porous	... ...	Abel.
Independent	Whit	.	11632·6	Fine grained but porous	... ...	Abel.
	Base	...	...	Rough, very porous; differing in strength, ascribed to the fossil markings	...	Abel.
	Roach	...	..	Very inferior; full of large loose petrifactions and cavities of considerable size. Strength half that of the above weakest stones	...	Abel.

Commissioners' Report on Building Stones, fol., 1839, 2nd edit., 1845. ABEL, *An examination into the comparative qualities and fitness for building purposes of twenty-eight samples of stones from different quarries in the Isle of Portland;* in BUILDER *Journal*, 1863, xxi, 859-60; in CIVIL ENGINEER, ETC., *Journal*, xxvii, 56; and Corps of Royal Engineers, *Papers*, new ser., xii, 6. DAMON, *Handbook of the Geology of Weymouth and the Isle of Portland*, 8vo., London, 1860; in BUILDER *Journal*, 1861, xix, 711-2: *idem*, iii, 101; iv, 89; v, 564; xxii, 911. BUILDING NEWS *Journal*, 1858, iv, 1181. CIVIL ENGINEER, ETC., *Journal*, 1866, xxix, 47. NOBLE, *Prof. Practice*, 8vo., London, 1836, p. 160. HULL, *Treatise on Building Stones*, 8vo., London, 1872. PURBECK. 1.

PORTMADOC SLATE; see FESTINIOG SLATE DISTRICT.

PORT NANT GRANITE; obtained from a quarry at Port Nant, near Port Dinllaen, Carnarvon Bay, from about 1865, is stated by J. Newlands, C.E., of Liverpool, to be a first class paving stone; was used for the tram road of Westminster bridge; the foundation works and pavement of the Thames Embankment; Charing Cross; east side of the Haymarket; Long Acre; and for many roads in Bermondsey.

PORTO (anc. *Portus Trajanus*), near the mouth of the river Tiber; see OSTIUM, in Italy.

PORTO; see OPORTO, in Portugal.

PORTO D'ANZIO (anc. ANTIUM), capital and seaport of Latium and of the Volsci, and later of Rome. The city was captured by C. M. Nepos, B.C. 337. Cicero had a villa there; and as the birthplace of Nero, he restored and adorned it with grand edifices; the two moles still remain, one 2,700 ft. long, the other 1,600 ft. At the close of XVII cent., pope Innocent XII formed a new port from the designs of Zinaglie; the Pamfilian mole was constructed some years later. The villa Borghese on the ancient necropolis, formerly belonged to the Costaguti family (plan with gardens in LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 88; 103; and a factory for building *barques*, pl. 110, drawn by Layrix). The villa Mencacci was bought 1820 from the Corsini. The old tower dismantled 1813 is supposed to have been built by the Frangipani, XIII cent.; restored middle of XVII cent.; and partially restored by Pius VII as a criminal prison for 200 persons. The statue of the Apollo Belvedere in the Vatican, was found towards the end of XV cent.; a left hand was added by Montorsoli. COLVIN, in NEW QUARTERLY MAGAZINE, April 1878, considers that the figure formerly held a Gorgon's head, and not a bow. 28.

PORTONE. The Italian term used by English writers, for a large decorated doorway, such as the one 23 ft. high and 9 ft. 4 in. wide, at Loreto, given in *Illustrations*, 1848-9, pt. 2, pl. 18, s.v. Doorway; and with others, by DONALDSON, *Modern Doorways*, 4to., London, 1836.

PORTO VENERE, and ANTIQUE PORTOR MARBLE. A black marble veined with yellow (BLACK AND GOLD MARBLE), quarried

at Carrara in Modena. The colours are very distinct from each other in good specimens. Six columns of this marble are used over the high altar in the Jesuits' church at Genoa (?). A modern PORTOR MARBLE is also quarried at Carrara; and at S. Maximin, near Toulon, in France, which is black veined with yellow and a little white. *Portor* is a modern marble of Genoa, and very highly esteemed. It is a deep black, or very dark purple, with elegant yellow veinings and golden spots. The most beautiful comes from Porto Venere. Under Louis XIV, it was largely used in the decorations at Versailles. ANSTED, *Geology, etc.*, 2nd edit., 1856.

PORTRAIT. An effigy, as on a tomb or in glass, representing a mason, or architect, or other chief workman. In early English wills and other documents, the term *pictor* occurs for an effigy in marble or brass. Such figures often hold a model of a church, but these may represent the bishop, or the founder of the edifice; as in Durham cathedral, where is a figure removed from the tower. At Worcester cathedral is one presenting a board to a superior; engraved in CARTER, *Ancient Arch.*, fol., i, 54; RAINE, *Catterick Church*, 1834, p. 14. ARCHÆOLOGICAL JOURNAL, iv, 18; and its Worcester meeting, 1851, p. 109. At Gloucester cathedral is one with a square only. A figure holding a square and compasses, *cir.* XIII cent., in STRUTT, *Ancient England*, 4to., pl. 65. At Winchester college chapel are the representations, in the glass, of the master mason, the carpenter, and the supervisor, as figured in *Journal* of the Arch. Institute, Winchester proceedings, 8vo., 1846. At Romsey church is a capital, carved on which are a king, two masons, etc., with implements and inscriptions. BRITTON, *Arch. Antiq.*, v, 227. The bosses to the vaulting of the room above S. Michael's chapel, Canterbury cathedral, are heads formerly inscribed Chillenden, Wodnesberg, and Molasch, all priors; WOOLNOTH, *Cath.*, 4to., 1816, p. 75. The portrait of R. Simons or Symonds, *temp.* Elizabeth, at Emmanuel college, Cambridge, is one of the early oil paintings of English architects

Many examples exist on the continent. In Reims cathedral is a brass slab with implements to LIBERGIERS, *cir.* 1263; DALY, REVUE GÉNÉRALE, i, 196. In the church of S. Ouen at Rouen, a brass unnamed *cir.* 1318; ARCHÆOLOGICAL JOURNAL, 1850, vii, 390-1, i; 403; and stone slabs to BERNEVAL, *cir.* 1440, and his assistant; WILLEMIN, *Mons. Franç. inedits*, pl. 159-60. In La Madeline at Troyes, to the constructor of the jubé. (See P. de MONTEREAU or de Montreuil of Paris, 1206.) LENOIR, *Musée, etc.*, v, pl. 172, gives a Limoges enamel of the tomb of Diana of Poictiers, either representing an architect or S. Thomas: in iii, pl. 116-7; and iv, pl. 212, are tombs of J. Goujon; G. Pilon; P. de l'Orme; J. Cousin; and J. Bullant; and of some other celebrated French architects. In S. Sebald church at Nuremberg, a statuette of P. Vischer; REINDEL, *Die Apostel, etc.*; ASSELINEAU, *Armes, Armures, etc.*, 4to., pl. 59-60. A drawing of a baumeister at Zurich, 1564; and a medallion bust of M. BOYTACA (or Potassi) of Lisbon, died 1528, are in the library of the Royal Institute of British Architects. Effigies of A. PILGRAM or H. BUCHSBAUM, died 1454, at S. Stephen's church, Vienna. In Ulm minster, the effigy of M. Ensinger, died 1463 is on the tower. In Milan cathedral, the portrait of Homodeus or Omodeo, 1501, occurs on a parapet.

PORTRAIT CHAMBER. An oak panelled room, *temp.* Elizabeth, occupying the entire attic story of one wing of Stanford court, Worcestershire, also used as a library, is described in ASSOCIATED SOCIETIES, *Reports and Papers*, 1865-6, p. 165-9, noticing one of a smaller size, *temp.* James I, at Hawsted place, Suffolk; and described by CULLUM, *Hawsted, etc.*, 4to., 1784. The burial chapel of the Heneage family, at Hainton, Lincolnshire, retains the name of "the picture house" from the monuments with painted effigies in it; WILLSON, in PUGIN, *Specimens*, Gloss. PICTURE GALLERY.

PORTRAITURE; purtreture in CHAUCER; pourtraicture, as BRITTON, *Arch. Antiq.*, iv, 12. A DRAWING, PICTURE, PATTERN, or MODEL, of a person or of a building. In 1538-9, P. Chambiges was paid "pour les formes et portraicts—de certains bastimens" (p. 142); and 1559 J. Androuet de Cerceau; "anciens petits plans et pourtraicts de bastiments de temples, etc., par moi dessaignés" (p. 100); BERTY, *Les Grands Architectes Franç.*, 8vo., Paris, 1860. ORDONNANCE.

PORTUGAL; ARCHITECTURE OF. The Iberians and the Celts were the oldest inhabitants of the country; the Phœnicians it is inferred visited the shores; the Carthaginians overran and subdued its western provinces; the Romans governed by their prætors the province of Lusitania, which, under Augustus, comprised the greater part of the modern kingdom with a considerable portion of Leon and Estremadura, a region inhabited by various nations of warlike people. A few Roman works exist at Beja and Braga, while those at Evora are unrivalled in the peninsula; large quantities remain at Aramenha; and at Castello de Vide is a fine marble portico found in and removed from ruins at Medobriga, both near to Portalegre. Remains of pointed arches indicate that the country was generally possessed by the Moors 713-1095; Lisbon in the north, was taken from them 1147, and in the south, the conquest of Algarve occurred 1223-66. The best mediæval buildings are named chronologically in GWILT, *Encyc. of Architecture*, edit. by Papworth, 1867. The later architects of Portugal were educated, if not in the schools of Italy, yet on the principles that guided the architects of that country. J. P. N. da SILVA, *Dissertation Artistique sur l'Arch. en Portugal depuis le xii au xviii siècle*, 8vo., Lisbon, 1869, notices the monasteries of Alcobaça, Batalha, Belem, and the royal palace of Mafra, as illustrative of Portuguese architecture exercising its influence in developing the civilisation of the Portuguese. The following names occur among the few native architects recorded, with some others.

1477-1504.	M. Annes.	1707-52.	F. Ludovici (Mafra).
1531-45.	F. and J. de Arruda.	1796.	G. A. X. Magalhaes.
1546-65.	M. de Arruda.	1578.	A. Mendez.
1490-1528.	M. Boytaca. (Belem.)	1387.	J. Oare.
	— Carvalho.	1388.	Ouguet (Batalha).
1519-81.	J. de Castilho.	1843.	J. Pires da Fonte.
1747-1825.	J. da Costa e Silva.	—	J. Potassi; see Boytaca
1386-1400.	A. Domingues.	1846	— Rambois.
1310.	D. Domingues. (Alcobaça.)	1821.	A. F. Rosa.
1325-1504.	Eanes (several).	1775-90.	E. R. dos Santos.
1448-77.	F. d'Evora.	1776.	E. dos Santos de Carvalho y Negreiros.
1480-1528.	M. and M. Fernandez.	1846.	J. P. N. da Silva.
1743.	T. Gaetan.	1802.	E. Gaetan de Sousa.
1548.	A. Gomez.		S. Stephenson.
1517.	J. Gonsalvez.	1580.	P. Terzo, Tercio, Tersis. or Estercio.
—	D. Hacket; see Ouguet.	1488.	J. de Tolosa.
1517.	F. Henriquez.	1547.	G. and J. de Toralva.
1402-51.	Huguet, or Huet; see Ouguet.	1629.	J. and L. Turriano.
1570.	Joanello.		Valentin.
1685-1736.	P. Juvara.	1402-48.	M. Vasquez.
1846.	F. Lodi.	-1786.	M. Vicente.

Publications relating to the towns and their buildings are not included in the following list.

FORRESTER, *Prize Essay on P.*, London, 1854. KINGSTON, *Lusitanian Sketches of the pen and pencil*, 1845. HARRISON, *Tourist in P.*, 8vo., 1839. KINSEY, *P. illustrated*, 8vo., London, 1828. VIVIAN, *Scenery of P.*, fol., London, 1839. BEGIN, *Voy. pitt. en Espagne et en P.*, 8vo., Paris (1850 ?). COLMENAR, *Les Délices de l'Espagne et du P.*, 18mo., Leyden, 1707. RACZYNSKI, *Les Arts en P.*, 4to., Paris, 1846, pp. 333 and 410; and his *Dict. Hist. Artistique en P.*, 8vo., 1847. LINK, *Voyage en P.*, 3 vols., 8vo., Paris, 1808. REICHARD, *Guide des Voyageurs*, vol. i, Weimar, 1820; Lisbon, 1821, 2, 3. LORD CAERNARVON, *Travels in Galicia and P.*, London, 1827. *Itinéraire du P.; Guide des Voyageurs*, 18mo., 1810. BARCLAY, *Arch. Sketches in P.*, fol., n. d. ADAMSON, *Lusitania Illustrata*, 8vo., 1842. DE MONCONYS, *Journal de ses voyages du P., etc.*, 4to., 1665-6. MURPHY, *Hist. of the Mahom. Empire in Spain*, etc., 4to., 1811; and *Travels in P.*, 4to., Lond., 1795. TAYLOR, *Voyage pitt. en Espagne et P.*, etc., fol. FINN,

History of the Jews in S. and P., 8vo., 1841. Alvarez, *Les Délices de l'Esp. et du P.*, 12mo., 1707; 1715; 1741. Mincano, *Dic. Geografico de E. et P.*, 4to., Madrid, 1826-9. *Ecclesiastical Tour in P.*, in Ecclesiologist *Journal*, 1853, xiv, 381; xv, 37; 110. Landscape Annual, *Tourist in P.*, drawings by J. Holland, 8vo., 1839. *Building Stones in Portugal*, in Building News *Journal*, 1875, xxviii, 120. 28.

PORTUMNUS; Temple of; at Ostia. Texier and Pullan, *Byzantine Arch.*, fol., London, 1864, p. 94.

PORUS or lapis Porinus. A species of marble used by the ancients, somewhat resembling the Parian both in quality and color, but is now unknown. It was found in Elis. Pausanias, Theophrastus, and Pliny, describe it as used in several fine structures and for statues. Ernesti thinks it may be the same as Peperino. 2. 6.

POSEIDON. The Greek name of Neptune.

POSEIDONIA, previously called by the Latins Poestum or Paestum (It. *Pesto* or *Pestum*). An ancient town of Magna Græcia, in Southern Italy. At first a Dorian or Greek colony or of the Tyrrhenian Pelasgi, it fell 275 B.C. under the power of the Romans; flourished after the fall of the empire; was destroyed by the Saracens at the end of the IX or early in X cent.; and much of the materials were removed by the Normans in XI cent. to Salerno for building the cathedral. Part of the walls, consisting of huge blocks without cement (assos); and one of the four gates having an arch 46 ft. high remain; Falkener, *Classical Museum*, 8vo., London, 1855, i, 36, shows the double walls 16 ft. 6 in. thick; also, i, 290. The buildings are among the earliest existing monuments of Grecian art, and are all of the Doric order (Freeman, *History*, 8vo., 1849, p. 116); and constructed of a stone analogous to travertine. The largest temple supposed to be dedicated to Zeus, or to Neptune, is peripteral and hexastyle, having 14 columns on the side, each 7 ft. diam. An edifice, called a basilica, peripteral or pseudo-dipteral, is divided in its breadth by a range of columns. It has 18 columns on the side, each 4 ft. 9 ins. diam. and 9 columns in each front. Three doors at the *west* end were noticed by Reveley. Another hexastyle peripteral temple, dedicated to Ceres or to Vesta, has 13 columns on the side, each 4 ft. 3 ins. diam. A fourth building was discovered in 1831, the capitals of which are stated to be the perfection of primitive Doric; bas-reliefs in the frieze of Jason? and the Argonauts. A few traces exist of a small theatre, and of an amphitheatre; porticoes of an agora in the centre of the city; and tombs near the river Salse. Curious paintings were found in one of the Greek tombs; Illustrated London News, xxvii, 1855, Nov. A large granite basin of the central fountain at Naples was taken from Pœstum (Napoli, p. 8). 1. 6. 14. 15. 25. 28. 50. 96.



Baron Antonini in his *Lucania*, 1745, mentions the ruins; and Mazocchi, *On the Heraclean Tables*, 1754, states that count F. Gazola, of Piacenza, was the first to notice them. Winkelmann visited the place 1758, and noticed it in his *Baukunst der Alten*, and *Hist. de l'Art*, 4to., Paris, 1803, ii, pl. 14. Mugnone, *De veris Posidoniæ ac Pæsti originibus diss.*, n. d. Anon., *The ruins of P.*, fol., London, 1767, 4 pl. engr. by J. Miller in a transl. in French by J. D. Varennes, 1769, the plates stated to be from drawings 1750 by Soufflot, some of which had been engraved and published 1764 at Paris by G. P. M. Dumont. Vedute di Pesto, etc., *raccolta degli antiche monumenti esitendi nella citta di Pesto*, etc., 100 views, 4to., Rome. Piranesi, *Différentes vues—de trois grands édifices*, 17 pl., fol., Rome, 1778. S. Non, *Voy. Pitt. de Naples, etc.*, fol., Paris, 1781-6, iii, 166. Paoli, *Pæstanæ Dissertationes*, 63 pl., fol., Rome, 1784, and *Rovini della città di Pesto detta ancora Possidonia*, 85 pl., fol., Rome, 1784. De Lagardette, *Ruines de P.*, fol., Paris, 1793-7. Stieglitz, *Archæologie der Baukunst*, ii; Hirt, *Geschichte der Baukunst*, i, 136. Wilkins, *Magna Græcia*, fol., London, 1807. F. de Cesare, *Antichità di P.*, 9 pl., 4to., Napoli, 1834. Romanelli, *Viaggio a Pompei, etc.*, 12mo., Nap., 1817; 3rd edit., Milan, 1831. Aures, *Etude des dimensions du grand temple de P., au double point de vue de l'Architecture et de la métrologie*, 4to., Nismes, 1868. Labrouste, *Restitution des temples*, Paris, 1878, (measured in 1818). Morey, *Restauration du temple dit de la Paix.* Thomas et André, 1848.

Daly, *Revue Générale*, 1858, xvi, 8-14. Reveley, *MS. Collection*, at R.I.B.A., fol., six pages of notes, *cir.* 1800. Aikin, *Doric Order*, fol., Lond., 1810. Dennis, *Cities of Etruria*, 8vo., London, 1848, i, 481-2: 2nd edit., 1879. Woods, *Letters*, 4to., London, 1828, p. 378. Gailhabaud, *Monumens d'Arch.*, 4to., Paris, 1842-52, i, gives the temple of Neptune; also in Chabat, *Fragments d'Arch.*, 4to. Paris, 1877, p. 15. Leake, *Morea*, 8vo., London, 1830, iii, 277. Blouet, *Morée*, fol. Paris, 1834-36, i, 69. Canina, *Archit. Antica*, fol., Rome, 1834-43, partie Romane; and his *Antica Etruria Marit.*, fol., Rome, 1851, pl. 124, gives the order of the last-discovered temple. Hosking, *Architectural and Sculptural remains*, in Archæologia, 4to., London, 1831, xxiii, 85-91, and 2 plates. Freeman, *Hist. of Arch.*, 8vo., London, 1848, p. 116; and his *Historical Sketches*, 8vo., London, 1876, p. 240. Twelve sheets of plans and details of the temples are in the library of the Inst. of Brit. Architects; and others by Tatham, at the South Kensington Museum. Doric Order. Orientation.

POSEN. The former capital of Poland; see Poznan.

POSI (Paolo), born 1708 at Siena. He constructed the Case del' projetti at Viterbo and Naples; gave designs for the restoration of the cathedral at the latter place; designed and erected many tombs, as for the cardinal Inico Carraccioli at Aversa; cardinal Imperiali, in Sto. Agostino at Rome; cardinal Caraffa, in St. Andrea de la Fratte; and the princess Odescalchi Chigi, with the lion, in the Madonna del Popolo; designed erections for the obsequies of pope Benedict XIV in the Vatican; for James Stuart III in the Santi Apostoli; and for Carlo Emmanuele, king of Sardinia, in the Sudaris: the fictitious façade in honour of the elevation of the cardinals Protocarrero, Crivelli, and Pamfilj, to the purple: machines for fireworks during many years as architect to the casa Colonna; and decorated the great altar of the church delle Anime, as if it had been a temple to Bacchus, but for which he was deprived of his post of architect. He was nominated architect to S. Peter's, but only adorned the altar of the Quirinal chapel; and was created a knight of the golden spur. At Sinigaglia he designed the church and house of the Jesuits; and at Sala, the residence of the abbot Farsetti, a Venetian: at Rome he modernised the palazzo Colonna; and restored 1780 the palazzo Sergardi, at Siena (Famin et Grandjean, *Arch. Toscane*, fol. Paris, 1806, pl. 93); where he rebuilt the national church of Sta. Caterina in the strada Giulia. The chapel in the west transept of S. Carlo in the Corso, at Rome, is attributed to Posi, by Gwilt, in Chambers, *Decorative part, etc.*, 8vo., London, 1825, i, 217, and stated to be one of the most magnificent in Rome. He died 1776. F. Catrano was a pupil. 3. 11.

POSIDONIA SCHIST. A black flagstone of the Isle of Man; Manx marble.

POSILIPO, Posilippo, Possilipo, and Pausilippo; see Napoli (p. 13).

POSNIKOFF designed at S. Petersburg, 1805-12, the church on the bank of the canal Ligoff, where was then celebrated the fête de Sémik; Svignine, *Descr.*, 4to., 1821, iv, 181, and plate.

POSONY or Posonia. (Lat. Anduetium or Porsonium.) The capital of Hungary after the loss of Buda in 1541, called Presburg and Pressburg, situated on the river Danube. The cathedral dedicated to S. Martin, erected 1074 or 1094 (26), has a tall campanile which was rebuilt 1765; a good porch, good tombs, and 1734 a rich marble chapel of S. John Elemosinarius. As the place of coronation of the kings of Hungary, it was 1865 to be restored by Lippert of Vienna. The church of S. Salvator dating

1636; the Trinity church 1717; the Franciscan church and monastery 1280; the ancient royal palace, a shell with a tall tower at each of its four angles; enlarged 1762-66, burnt 1811, and not since restored; the modern archbishop's palace, and his summer palace in the suburbs; the *comitats haus* 1724; the *landhaus* 1756; the very old and large *rathhaus* with a high tower; the modern palace of prince Grassalkovics; and a pretty modern theatre, are other places of note. 14. 26. 28. 50. 96.

JENNY, *Handbuch;* VON THIELE, *das Königreich Ungarie;* BLUMENBACH, *Gemälde der Oester. Monarchie.* HASSEL. BEATTIE, *Danube illust.*, 4to., 1844. MARMIER, *Du Rhin au Nil*, 8vo. Paris [1846]. STEIN.

POSPHORUS (CAIUS JULIUS); see JULIUS POSPHORUS (C.). Another inscription records "L. Statius Posphorus L. Statio Hesperi frater et libertus ejus"; FABRETTI, *Inscript.*, i, p. 7: and *Corpus Inscrip. Ital.*, 4to., Turin, 1867.

POST, or Pillar, for a Lamp; see CANDELABRUM.

POST. An upright piece of timber used as a support: as a STORY POST; PARTITION: STUD: or in roof framing, as KING POST; or QUEEN POST; also door post (DOOR CASE); or to steady other work, as in a fence or to a gate. It is observed that, in a fence fixed fourteen years, all the posts which had been placed in the same direction as the growth of the timber had rotted at the bottom, while those which had been inverted remained sound; BUILDER *Journal*, 1854, xii, 468: and xviii, 240. CHARRING. A pitch pine post was exposed to a petroleum fire for seven hours by capt. Shaw with a satisfactory result; BUILDING NEWS *Journal*, 1874, xxvi, 227. HAUPT, *The resistance of Posts to flexure*, in the *Journal* of the Franklin Institute; and in CIVIL ENGINEER, ETC., *Journal*, 1849, xiii, 302: also notes by LAMARLE, 1844, vii, 264. PUNCHEON.

Lee and Rogers' "Riband post" or pillar, is described in BUILDING NEWS *Journal*, 1872, xxiii, 28.

It is sometimes of stone, as to a gate, or to a fence; very enriched and unique examples are given in FERGUSSON, *Indian Arch.*, 8vo., London, 1876. It is also of stone or of metal, as at the corners of street pavements, to prevent carriage wheels running thereon; or against buildings.

POST (PIERRE), born early in XVII cent., at Haarlem, son of Jean Post, glass painter, was appointed architect to the prince of Orange, accompanied prince Maurits to the Brazils, where he converted the churches and other edifices of Olinda into fortifications, etc; and designed many private dwellings at Mauritsburg, now Pernambuco. In Holland, he designed Huister Hart, or the château de Swanenburg, afterwards belonging to the directeurs des digues, between Amsterdam and Haarlem; the New church at the Hague; the public weighing house at Gouda; the château de Vredenberg in north Holland; the château de Rijxdorp near the Hague, afterwards belonging to the Wassenaer family; with the château called salle d'Orange near the Hague, also called salle du bois, "House in the Wood", and salle de la princesse; and 1659-63 (1652 in GOETGHEBUER, pl. 91-2) the town hall (Italian) at Maestricht. The hôtel 1640 for prince Maurits at the Hague, is attributed to him, and to him with van Campen; it was burnt 22 Dec. 1704 and rebuilt on the same plan; it is given in *Les Ouvrages d'Architecture ordonnez par P. P.*, 77 pl., including 28 pl. of chimney pieces and portrait of William of Orange, fol., Leyden, 1715; and 75 pl., 1717: *Afbeeldinghen van weinighe schoorsten wercken*, 22 pl., by Mathys, fol., Amst., n. d. *Begraeffenisse van syne Hoogheyt Fred. Hen. prince van Orange*, fol., Amst., 1651. WEALE, *Handbook to Belgium*, etc., 8vo., London, 1859. COMMISSION ROY. d'Hist. de Bruxelles, *Bulletins*, 8vo, Brux., 1848-9, xiv, 71; xv, 139. The date of his death has not been recorded.

POST AND PAN or PANE; POST AND PETREL or PETRAIL. Terms applied in Lancashire to the construction of some of the half-timber houses of XVI cent., abounding in that county. The word 'petrel' is apparently a corruption of the Fr. *poutreille*, a cross beam; and the latter may be derived from Latin *panna*, a wall plate, as used in the Assize 1189 of London. BUILDER *Journal*, 1870, xxviii, 325; 350.

POST AND RAIL. See FENCE and PALING. PRICK POST.

POSTE. The Italian, and *postes*, the French, terms for the so-called Vitruvian scroll. MEANDRE. 25.

POSTEL (GUILLAUME), constructed towards the end of the XVIII cent. the great tower to the left of the bridge of S. Michel, at Amiens. DUSEVAL, *Recherches Hist.*

POSTERN. A small doorway, or gateway at the back of a building; a term generally used in describing mediæval military edifices, where it is found in the surrounding wall so as to afford private communication with the country. A small door at the side of a larger one is sometimes so-called. 19.

POST HOUSE. A place erected along a main road to provide horses and conveyances for the convenience of passengers. On the Roman roads, such houses were everywhere erected at the distance of only five or six miles; each of them was constantly provided with forty horses, and by the help of these relays it was easy to travel a hundred miles in a day along the Roman roads; GIBBON, *Decline, etc.*, chap. ii; or edit. 1853, i, 68. Some Italian post houses are given in LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 62; 90; 112.

POSTHUMIUS (CAIUS), architectus B.C. 30, and a freedman. L. COCCEIUS AUCTUS is said to have been a disciple. REINESIUS, *Syntagma*, fol., Leipsic, 1682, p. 616. POSTUMIUS. 3. 56.

POSTICUM. (Gr. οπισθοδομος). The Latin term for the portico to the back or rear of the ancient temple. PARATHURA. OPISTHODOMOS. The temples of Apollo Didymæus near Miletus, at Jackli near Mylasa, of Jupiter Nemeus in Achaia, and on the Ilissus at Athens, had no central door to the cell in that front, nor had the first the posticum, which in the aspects of the amphiprostylos, peripteros, pseudodipteros, dipteros, and hypœthros, answered to the PRONAOS at the opposite end of the cell; it is also omitted in the temple on the Ilissus; SOCIETY OF DILETTANTI, *Ionian Antiq.*, fol., London, 1769, i, 47. FESTUS, *Verb. Sig.*, fol., Leipzig, 1839, lib. 14, p. 220.

POST MORTEM HOUSE; see MORTUARY HOUSE.

POST OFFICE. An establishment for the collection and delivery of letters and other matters in connection therewith. 14

1829. S. Martin's-le-Grand, London; by Sir R. Smirke, is engraved and described in LEEDS, *Public Buildings*, etc., 8vo., London, 1838. Paris; MONITEUR DES ARCHITECTES, 1854, pl. 277, etc.
1850. Devonport; by G. Wightwick; ARCHITECT *Journal*, 1850, ii, 223.
1866. Edinburgh, New General; BUILDER *Journal*, 1866, xxvi, 443.
1869-75. New York: by A. B. Mullett; BUILDING NEWS *Journal*, 1869, xvi, 226; 1875, xxix, 353; B. *J.*, 1870, xxviii, 124; 1871, xxix, 924 view; xxx, 381 view; and American MANUFACTURER AND BUILDER *Journal* for April 1871.
George Town, D.C.; Portsmouth, N.H.; Ogdensburgh, N.Y.; Plattsburgh, N.Y.; Rutland and Windsor, Vermont; and Springfield, Illinois; are given in UNITED STATES, *Specifications*, etc., 8vo. and fol., Washington, 1856. These edifices also contain either the court house or the custom house.
1870. London, New General; by J. Williams; B. *J.*, xxviii, 1021; BUILDING NEWS *Journal*, xviii, 171.
1872. Wolverhampton; by J. Williams; B. *J.*, xxx, 1003.
1874. Carlisle (the Athenæum converted); B. *J.* xxxii, 182.
1874-5. Bombay; by J. Trubshawe; B. *J.*, xxii, 437; xxxiii, 207.
1875. Peckham (subdistrict): B. *J.*, xxxiii, 389.
1875. Hull; by J. Williams; B. *J.*, xxxiii, 858.
1875-6. Glasgow; by — Matheson; B. *J.*, xxxiv, 1051, plan.
1876. Warrington; by J. Williams; B. *J.*, xxxiv, 40.
1876. Leith; B. N. *J.*, xxx, 534.
1879. Ipswich; B. *J.*, June 10, 1880.

POSTSCENIUM; see PARASCENIUM.

POSTUMIUS POLLIO (CAIUS). This name occurs in an inscription in the cathedral at Terracina, from which it may be inferred that he was architect of the celebrated temple of Apollo at that place. From another inscription it appears that C.

Cocceius was his freedman and disciple. Rochette, *Lettre à M. Schorn*, 2nd edit., 440-1. Posthumius. 59.

POTAIN (Nicolas Marie), gained the grand prix 1738, and studied at Rome. He became controleur générale des batimens du château de Font; member 1755, or 15 Sept. 1756 of the academy of architecture at Paris; and after 1755 garde des plans des châteaux, parcs, et maisons royales, as controleur; and was architecte du roi. There is a plan, with his name, of the old and new sites for and of the parish church of S. Germain en Laye, ordered 15 Feb. 1765, erected 1787-91: it was rebuilt 1823-27 by A. J. Malpièce and — Moutier; (Patte, *Mémoires*, 4to., Paris, 1769, p. 205, pl. 6). He published *Détails des ouvrages de menuiscrie pour les Batimens*, 8vo., Paris, 1778; and *Traité des Cinq Ordres d'Arch.*, 4to., 1767; and died 1791. Lance, *Dict. Biog.*, 1872.

POTASSI (João), an Italian (*Handbook*), is supposed to be the same as Boytaca.

POTASSIUM. A metal, the base of the alkali potash, in which it exists combined with oxygen, was discovered 1807 by Sir H. Davy. In colour and lustre it strongly resembles mercury; at 50° it is soft and malleable; at 70° degrees becomes fluid; melts perfectly at 150°; is a good conductor of heat and electricity; tarnishes rapidly by exposure to the air; and by combining with oxygen it becomes "oxide" of potassium or potash. This forms two compounds, "protoxide" and "peroxide" of potassium. The former has been long known, and was called the vegetable alkali, or *potash*, more correctly "hydrate" of potash, now frequently called potassa; it is composed of one equivalent of oxygen 8, and one of potassium 40, making equivalent 48: it exists in largest quantities in felspar, as a silicate. "Hydrate" of potash is white, hard, and brittle, extremely caustic destroying the cuticle, and acts strongly on vegetable yellows; largely employed in glass-making, especially flint glass; in making soft soap; and in many chemical arts; by acids it is converted into various salts of great importance. "Peroxide" of potassium is not used. "Ferrocyanide" of potassium, sometimes called Prussiate of potash, or the triple Prussiate of potash; when animal matter is heated in an iron vessel with potash a compound is obtained, which is soluble in water, and by evaporation yields large fine yellow crystals; when added to a solution of a persalt of iron, Prussian blue is formed.

The first salt of potash is "nitrate" of potash, *nitre*, or *saltpetre*. It fuses at about 616° Fahr. An ounce of nitre in water is capable of reducing five times its weight of water 15°. "Chlorate" of potash is prepared by passing chlorine gas into a solution of potash. When triturated with certain inflammable bodies, as sulphur and phosphorus, combustion or explosion, or both, are produced. It is used in the manufacture of matches fired by friction. When mixed with sugar, metallic arsenic, or antimony, a drop of sulphuric acid will set the whole in rapid combustion. "Carbonate" of potash is refined "pearl ash", which is procured by the incineration of wood. It is used largely in the arts; decomposed by most acids, with effervescence of carbonic acid gas; by lime; and by barytes.

Potashes are made in Canadian clearances where trees are cut down, cut into many lengths, and set on fire; water is poured over the ashes, and evaporated by boiling. "Pearl ash" is made by a further process. Adding seven or eight pounds' weight of pearl ash to the water in a fire engine, and more as required, is said to assist the incombustibility of timber in a fire. (Incombustible.) "Permanganate" of potash; a few drops put into water, even when tasting and smelling of decaying organic matter, will render it clear and sweet. "Bichrate" of potassium produced at Paris an explosion; *Newspapers*, 21 March 1869. "Bichromate" of potash produces the yellow and orange chromates of lead, used in dyeing wool black. "Silicate" of potash applied by a brush will unite stone, glass, and pottery, and wherever glue would be used; Bru, in *L'année scientifique et industrielle*, 1861, p. 481: Waterglass, or oil of flint: Kuehlmann's process for preserving stone. All the Year Round *Journal*, 1862, vii, 561. 14. 71.

POT or Jar. The names and forms of ancient examples are given s. v. Amphora: Figs. 6, 29, and 30, have been found to contain corpses or portions of one. Burying the dead in jars was practised in Greece, Roumelia, Anatolia, Mytelene, the Ionian islands, the Crimea, and many other places. The pots range from 2 ft. 2 ins. long by 1 ft. 8 ins. wide, to 6 ft. long by 4 ft. 7 ins. wide; are formed of coarse red clay; and placed in a horizontal position, with a flat stone covering the mouth, which invariably faces the south or south-east. The largest and most perfect jar was found near the site of the ancient Dardanus; six persons could sit in it: Illustrated London News, xxviii, April 1856, p. 451. Urn.

POT; see Chimney pot.

POT CONSTRUCTION. Earthenware or terra cotta pots were used for constructive purposes in ancient buildings, such as for filling in the spandril of arches where the former were deep and the crown thin, and it was necessary that the spandril should be as light as possible; as practised A.D. 311 at the circus of Caracalla, properly of Romulus son of Maxentius, without the walls at Rome (Starke, *Travels*, 8vo., 1839, p. 163); also A.D. 28, at the tomb of the empress Helena; at S. Stefano rotondo (Nesbitt, in Archæologia, 1867, xl, pt. 2): the dome at Ravenna baptistery, and of S. Vitale (Cordero, *Dell' Italiana Architettura*, 8vo., Brescia, 1829, p. 204, gives the date as v or vi cent. for their use); and the vaults of the church and chapels in S. Giovanni in Laterano at Rome (Vasari, Life of A. di Lapo). On the road to Torda from Naples, and near the marina de Nerano, are, situated on a precipice towards the punta S. Elia, the ruins of the church of S. Pietro, built in the style of the Roman basilica with antique remains; the outer walls are of coarse earthen vases resembling those of the circus of Romulus at Rome, supposed for the purpose of lightening the building. The church was repaired 1490. *Handbook*, 1853, p. 232-3.

Modern instances comprise:—the dome of the rotunda, Bank of England, by sir J. Soane, R.A.; by J. Nash at Buckingham palace; by W. Wilkins, R.A., at the National gallery; and the vault of the room added 1837-9 by C. R. Cockerell to the University library at Cambridge. Arching by common flower pots bedded solidly in cement was used at the first baths and washhouses in Lambeth; but the girders from which the arches sprung, being of timber, rotted, and the construction failed. Similar shaped pots were used in the original floors at Nos. 11 and 12 Hinde street, Manchester square. Champagne bottles will often withstand a pressure of 40 atmospheres and upwards, that is, 600 lbs. on the square inch, and are suggested as useful for such a purpose; Appleton, *Dict.*, s. v. Glass, 868. Earthenware. Hollow brick.

The construction of *vaults*, *roofs*, and *floors*, with pots, is noticed in the following publications:—Isabelle, *Les édifices circulaires*, fol., Paris, 1855; pl. 48; p. 96, 110. Pasley, *Course of practical Arch.*, 4to., Chatham, 1826, p. 175-85. Burgess, *Antiq. of Rome*, 8vo., London, 1831, i, 186. Underwood, *Mem. regarding Syrian or cylinder roofs*, in the Madras Journal, No. xix, 8vo., 1838: and in *Papers* of Corps of Royal Engineers, new series, 1849-50, p. 34-8. Hubsch, *Die ältchrist. kirchen*, etc., fol., Carls., 1858, pl. 16, 22. Scoles, *Ceiling of a passage at Syracuse*, read Jan. 1847, at Roy. Inst. Brit. Architects. Simms, *French method of constructing flat roofs;* read at Inst. of Civil Engineers, Feb. 1838; Civil Engineer, etc., *Journal*, i, 140. Vabre's pots for roofs, *Inst. C.E.*, xiv, 523. Allgemeine Bauzeitung, *Paris manufacture*, 1837, pl. 144. Rondelet, *L'art de bâtir*, fol., Paris, 1812, pl. 69. Seroux d'Agincourt, *History of Art*, fol., London, 1847, p. 22-3; 71. Braun, *Rome*, 12mo., Bruns. 1854, p. 39; 53. Gally Knight, *Eccles. Arch.*, i, 9. Denon, *Sicily*, etc., 8vo., Lond., 1789, p. 346, near Acradinum. S. Non, *Voy. Pitt. de Naples*, fol., Paris, 1781-6, ii, 72-8; pl. 2 of Circus. Batissier, *Monumens*, 488. Birch, *Pottery*, 1858, i, 142,

321; ii, 194; 236; 255. STUART, *Dict.*, s. v. Floor; pot arch; and s. v. Phial.

BUILDER *Journal*, by Rawlinson with experiments, 1849, vii, 183; 213: 1854, xii, 96; xiii, 299; 359; 1864, xxii, 120. BUILDING NEWS *Journal*, 1857, iii, 251, hollow cylinder called a globe, for a floor. At Bengal, in LOUDON, *Villa Architecture*, § 585, end. CIVIL ENGINEER, ETC., *Journal*, 1855, xviii, 252. NOTES AND QUERIES *Journal*, Ser. 1, xi, 75.

For the use of brazen pots in Roman theatres, see ECHEIUM.

Pots or jars found in certain walls of mediæval buildings, and under the choir stalls, are supposed to have been inserted to improve the resonance of the edifice. They occur at Fountains abbey, Yorkshire; Royal Institute of British Architects, 1849; 1852; 1854: in S. Peter's Mancroft church, Norwich; R.I.B.A. *Notice paper*, 16 April 1855, and earlier; BUILDER *Journal*, 1863, p. 893: and in All Saints church, Norwich; B.J., 1866, xxiv, 392; and *Papers* of Norfolk Architectural Society. S. Mary, Youghal; S. Clement's, Sandwich, where three were found high up in the chancel, BUILDING NEWS *Journal*, 1873, xxv, 24; 50: and DUGDALE, *Monasticon*, fol., London, 1823, iv, 110, mentions three ranges of coarse earthen vessels of different sizes found in the south wall of Fairwell church, Staffordshire, when pulled down in 1747; one is engraved in GENTLEMAN'S MAGAZINE, 1771, and copied in SHAW. At Denford Church, Northamptonshire; B.J., 1864, xxii, 953. At S. Peter's Upton church, near Newark; ASSOCIATED SOCIETIES, *Reports and Papers*, 1871, p. 13. SMITH, on *Acoustics*, at R.I.B.A., 1860, p. 85.

At Strasbourg cathedral. S. Martin's, Angers, in the vaulting; BROMET, at R.I.B.A., 22 Feb. 1847. Abbé COCHET, *On Acoustic Pottery*, in GENTLEMAN'S MAGAZINE, for Nov. 1863; enlarged upon in BUILDER *Journal*, 1863, xxi, 820: also 1864, p. 17. DIDRON, *Annales Arch.*, xxii, 294. VIOLLET LE DUC, *Dict.*, s. v. *Pot*, who says they were chiefly employed in Normandy. In the walls of S. Jacques et les Innocents, at Paris, pulled down 1786; LEGRAND ET LANDON, *Descr. de Paris*, etc., 8vo., Paris, 1808, i, 147.

POT COVER. The stone flag used for covering the brickwork setting of a set pot (or copper). It is advisable to use a soft stone for this purpose, as they usually resist heat better than hard ones. At Leeds it is often known as "pot carve" or "pot cove".

POTENZA (Lat. *Potentia*, its site is near Murata). The capital of the province of Basilicata, in South Italy. It was destroyed by Frederick II (1210-50), and by Charles of Anjou, and has suffered much by earthquakes, especially that of 1857-8; ATHENÆUM *Journal*, 1858, Jan. 2, p. 20; and 10 July, p. 55. It is the see of a bishop. Of the three churches, a fine cathedral, dedicated to S. Gerardo vescovo, is of the Doric order. 28. 96.

POTES (FRANCISCO DE), *aparejador* at the palace in the Alhambra at Granada, succeeded P. de Velasco on his death some time before 1621, and became *maestro mayor*. He went 1623 to Madrid to report that the vaults being formed, the roof should be put on; the building was continued by him until 1633, when it was stopped for want of funds. His reports on works to be done for Philip II are given in LLAGUNO. He was also *maestro mayor de las obras* of the order of Alcantara, and died in 1637. 66.

POTHÆUS, of Olympia, see ANTIPHILUS.

POTIER (. . . .), PORTIER occurs on the plan by him of the *place S. Julien* at Bordeaux, where he constructed 1753 the Aquitaine gate; and the hôtel des monnaies, now occupied by a congregation of Ursulines. JOANNE, *Guide, Loire et Centre*; LANCE, *Dict.*, 1872.

POT METAL. A composition of copper and lead, or bell metal, used for chemists' mortars; as also for brass cocks, weights, and pots.

POT METAL. The glass coloured by metallic oxides, being mixed with it whilst in a state of fusion; hence it differs from painted and stained glass. It is used for glazing. FLASHED GLASS is now more generally used in stained glass windows. CIVIL ENGINEER, ETC., *Journal*, 1846, ix, 126. WINSTON, *Enquiry*, etc., 8vo., Oxford, 1847: and *Revived manufacture of coloured glass*, read at INSTITUTE OF BRITISH ARCHITECTS, *Sessional Papers*, 14 June 1852. A description of some specimens of early XV cent. date; NEALE, *Westminster Abbey*, 4to., London, 1818-23, ii, 142.

POTRE; see PAUTRE.

POTSDAM. The Windsor or Versailles of Berlin, situated on an island about 18 miles in circuit at the confluence of the rivers Ruthe and Havel. It consisted of only four streets previous to the time of Frederick II (the great, 1740-86), who erected almost the whole of the new town, the stone façades of the houses being made to look like rows of palaces; many were designed by Hildebrand and others. The Brandenburg gate is copied from the arch to Trajan at Ancona. Of the seven bridges over the river Havel, the best is the Teltow, 600 ft. long and 30 ft. wide, consisting of eight iron arches on stone piers. At the residenz palatz or old schloss the garden façade was built 1660 by Philippe de Chiese or F. di Chieze; 1683-95 the return sides added by J. A. Nehring; and completed by J. von Bodt, who erected the *schloss thor*, and the *portail* with the cupola on the side next the market, the *saülensgangs* thereto, and the *kuppel* 54 ft. high in the market place; baron Knobelsdorf added the Corinthian columns and pilasters, and erected the third storey, the marble staircase, etc., before 1753. The former orangery by J. A. Nehring was rearranged *cir.* 1730 for the royal saddle horses by P. von Gayette; and a new orangery erected *cir.* 1745, by F. W. Diterichs. The *rathhaus*, *cir.* 1720-34 by P. von Gayette, or 1754 by J. Boumann after that at Amsterdam. The Berliner thor 1754 by J. Boumann. Extensive barracks by Knobelsdorff, with an exercising house 660 ft. long and 75 ft. wide. The façade of the *stechbahn* (tilt yard) 1701 by J. von Bodt. The casino by Schinkel (*Sammlung*, pl. 78); and a country house (pl. 60). A bronze statue of Fred. William III (1797-1840) by Kiss. The Garnison kirche designed by P. Gerlach, erected by — Feldmann, was completed 1735-39: it contains the tombs of its founder king Fred. William I (1713-40), and of Frederick II (the great 1740-86). The Heiligegeist kirche, 1728, by P. von Gayette; its tower 280 ft. high by J. F. Grahl or Grael. The French church (Doric), after the Pantheon at Rome, by J. Boumann, completed 1752. S. Nicolaikirche (Corinthian), 1830-37, by Schinkel (*Sammlung*, pl. 132-6), the dome 1845 by Stueler; and a church in the market place (pl. 67). The cost of the new church and of the casino are given by BEUTH, in Royal Inst. of Brit. Architects, *Transactions*, 1842, pt. 2, 114-5.

The royal schloss Sans Souci, for king Frederick the great, is of one storey, 1745-47, by F. W. Diterichs, or by Knobelsdorf; the *grands communs*, *cir.* 1763, are by J. Legeay; the buildings were altered after 1765 by C. von Gontard, who also designed many edifices until 1778: the palace was restored for king Fred. William IV, who died here in 1861. The lower part of the garden is reached by six terraces; the old gardens were laid out by Switzer in the formal French, Dutch, and Italian manners; modern buildings comprise an orangery 950 ft. long, completed 1856, and decorated with copies of Raphael's paintings; a Chinese tower; a belvedere, etc.; and a fountain with a jet 120 ft. high. The gardeners' lodge is given in ALLGEMEINE BAUZEITUNG, 1844, Ser. 1, pl. 598-600: the celebrated windmill as rebuilt by the king, ILLUSTRATED LONDON NEWS, 1850, xvii, 76. MANGER, a German architect, and F. Z. Saltzmann, the royal gardener, have described their works in *Plan du palais S. S.*, fol., 1779. View in LOUDON, 120. PIRANESI, *Plan du palais de S. S.*, fol., Rome (1780 ?) numbered 1035. The Friedenskirche (Byzantine) by Persius, after San Clemente at Rome, carried out by Arnim under Stueler (ALLG. BAUZ., 1843-46; BUILDER *Journal*, 1848, vi, 10). The *neue palais*, a vast red brick edifice with stone dressings (rococo), erected 1763-69 by Jean Legeay for king Frederick II, who destroyed

the accounts. The *communs*, or servants' offices facing the palace, are now used as the trained infantry barracks: in a temple near is a statue of queen Louisa (1853) by Rauch, executed fifteen years after that by him at Charlottenburg. GRANVILLE, *S. Petersburg*, 8vo., London, 1835, i, 252, gives a view. OESTERREICH, *Descr. de tout l'intérieur des deux palais de S. S.*, etc., 4to., Pots., 1773. The neue palais, now *marble palace*, on the Heiligensee, for king Frederick II, 1786-97, by C. von Gontard, praised by Wilson, *Tour on the Continent*, 1820, as one of the best pieces of architecture (Italian) in Prussia; the English gardens laid out by Hirschfeld, all under the direction of counsellor Langhans; given in LOUDON, § 319. This palace has the large GROTTO, 63 ft. by 72 ft., on the ground floor: and the marble hall, 160 ft. by 100 ft. by 50 ft. high. The *pfingstberg*, an imitation of a villa at Tivoli, with high towers. Charlottenhof, a villa for king Fred. William IV, by Schinkel (*Sammlung*, pl. 109-114), is a copy of the house of Glaucus at Pompeii; the gardener's house (Italian, pl. 145-8); and some dwellings near (pl. 173); Pompeian bath with frescoes in the garden. The forester's and other lodges in the *Wild Park* by Persius, are given in ALLG. BAUZ., 1843, pl. 544-56; PERSIUS, *Bau Ausführungen in Schloss Park*, etc., fol., 1843.

In the vicinity are; the *Brauhausberg* with promenades; the *pfaueninsel*, island of peacocks, the grounds laid out in the English style for king Fred. William III. The Russian colony, *Alexandrowka*, established 1826, of eleven houses, with a Greek chapel; OTTO, in GARDENER'S MAGAZINE, iii, 93. S. Petri und Paul kirche zu *Nicolskoë*, by Stueler and Schadow; ARCHITEKTONISCHE ALBUM, fol., Berlin, 1838. Church at *Sacrow* (Byzantine) 1842-43, by Persius; ALLG. BAUZ., 1845, pl. 688-9; CIVIL ENGINEER, ETC., *Journal*, 1846, ix, 161. A maison de garde d'une forêt, by V. Gottgetreu, in MONITEUR DES ARCHITECTES, 1854, xxiii, pl. 275: two houses on the road to Potsdam, by Knoblauch; ALLGEMEINE BAUZEITUNG, pl. 515 and 587; and métairie royale at *Bornim*, 1846, ser. 2, pl. 45-9. *Babelsberg*, the prince of Prussia's new palace (Gothic), 1835-49 from a design by Schinkel (*Sammlung*, pl. 162), carried out by Persius, who designed the fountains, etc. The grounds were laid out by prince Pückler Muskau: the engine house, ALLG. BAUZ., 1846, ser. 2, pl. 42-44. RIEGEL, *The castle at B.*, 12 col. pl., after originals by Gæb, fol., Pots., 1853. *Glienicke* in 1784 came into the hands of general Möllendorf, who established kilns for making bricks, used at Berlin; it then belonged to count Hardenberg, who, after the peace of 1814, invited Repton to lay out the grounds, whose designs were carried out by Wörlitz of Berlin. The count erected a small villa, eventually enlarged for prince Fred. Charles 1824-37 by Schinkel (*Samml.*, 169-71); a bridge (ALLG. BAUZ., pl. 577, ser. 1).

At Charlottenburg, the schloss 1706 by Schlüter for king Frederick I; the new wing was added by Knobelsdorf; a house 1823 in platz Louisa for the banker Behrends, by Schinkel (*Samml.*, pl. 36), who also designed the mausoleum (Doric) to queen Louisa (died 1810), with statue 1838 by Rauch.

Plan by Le Rouge, 1775. *Map* of Potsdam, 1845. HESSE, *Sanssouci in seinen architekturen*; and *der situationsplan von Sanssouci*; with HAEBERLIN and LENNÉ, *Sanssouci, Potsdam, und Umgegend*, 8vo., Berl., 1855 (*temp.* Fred. Will. IV). BUILDER *Journal*, 1858, xvi, 232. NICOLAI, *Beschreibung der Königlichen Residenzstädte Berlin und Potsdam*, 2 vols., 8vo., Berlin, 1769; 1779, 3 vols.; and 1786; and *Descr. des villes de B. et Potsdam*, 8vo., Berl., 1769. LOUDON, *Encyc. of Gardening*, 1850. BAEDEKER, *Guide*. 14. 28. 50.

POTSTONE, or *lapis ollaris*. A coarsely granular variety of steatite or soap stone, which on account of its tenacity, infusibility, and the ease with which it may be turned in the lathe, is used in Germany, France, Italy, Corsica, and island of Sark, for ornamental purposes. Inverary castle, Argyleshire, begun 1745 by R. Morris, is built of potstone of a grey sombre hue, which is soft under friction, admits of a fine polish, and resists the effects of the weather equal to the hardest marble; the stone was brought from the opposite shore of loch Fyne; NEALE, *Seats*, etc., 1823, vi. Agalmatolite, or potstone, abundant in the county of Donegal in Ireland, is locally called *cam-stone*; WILDE, *Catalogue*, 8vo., Dublin, 1857, p. 93.

A potstone impregnated with hornblende, called *balapum*; BUCHANAN, *Mysore*, 4to., London, 1807, iii, 389; JACANACHERY. An indurated potstone of volcanic origin found near HULLYBEDU or Hullabîd, is soft when first quarried. The fine *temple* there was built in block and carved long after the stone had become hard; as now seen, it is of a pleasing creamy colour, and so close grained as to take a polish like marble. The pillars of the great Nundi pavilion, which look as if they had been turned in a lathe, are so polished as to reflect light from each other; and though exposed for six centuries, the minutest details are as sharp as when finished: its erection was stopped by the Mahommedan conquest; FERGUSSON, *Indian Arch.*, 8vo., 1876, p. 400-1.

POTTERNEWTON STONE. A sandstone obtained from quarries in the outskirts of Leeds in Yorkshire, producing good wallstones, and flags, with a small quantity of ashlar for local use. Wallstones are from 3 ins. to 8 ins. thick, usually either hammer-dressed or pitch-faced. The flags are used principally in the smaller houses in the district. SCOTT HALL quarry, nearer the town, supplies stone from a lower lift of the same formation as Potternewton, but of a lighter colour, and appears to be very durable. The supply is principally ashlar and blocks for sawing into slabs, a considerable portion of which is sent to the south of England.

POTTER'S CLAY. A coarser sort of clay than that used for making porcelain; it is generally obtained from Dorsetshire and Devonshire, and mixed with ground flints after undergoing a purifying process; this mixture is called *slip*, and when the water is sufficiently evaporated it forms a doughy mass.

POTTERY; PORCELAIN; and CHINA. (Fr. *céramique*; Ger. *steingut*; *porcellan*). This manufacture has been intimately connected with the fine arts from its earliest history. Chemically there are only two genera of ceramic ware. 1. A fusible earthy mixture, along with an infusible, which, when combined, are susceptible of becoming semi-vitrified and translucent in the kiln: this constitutes true PORCELAIN or chinaware; and is also called *hard* and *genuine*, or tender or spurious, according to the quality and quantity of the fusible ingredients. The tender or *soft* porcelain is an earthy body, which is covered with and penetrated by a transparent glaze. 2. An infusible mixture of earths, refractory in the kiln, and continues *opaque*. This is POTTERY properly so called. It comprehends several subspecies which graduate into each other by imperceptible differences; as EARTHENWARE, STONEWARE, TERRA COTTA, faïence or fayence and majolica, DELFTWARE, iron-stone, china, etc. The manufacture of PORCELAIN is a more refined branch of art than *pottery* as usually classed. Clay from Poole in Dorsetshire, and near Newton in Devonshire, are the best for use in Staffordshire; flints, chert, felspar, bone-ashes (phosphate of lime), steatite or soap-stone, china-stone or decomposed granite, are the substances which enter into the body of the ware; URE, *Dictionary of Arts*, 1875. GLAZE. TILE. CERAMICS or Ceramic manufacture. *Faïence*, Fr. for 'cracking', and also a general term for enamelled clay; called *maiolica* in Italy, a soft enamelled pottery, commenced early in XII cent. PESARO.

BOHN, *Guide to the Knowledge of Pottery and Porcelain*, 8vo., London, 1872. SPARKES, *Some recent inventions, etc., of Lambeth Stoneware, Terra Cotta, etc., for internal, etc., decorations*, read at SOCIETY OF ARTS, *Journal*, 8vo., London, 1874, p. 557-67. SPARKES, *Handbook to the Practice of Pottery Painting*, 8vo., 1877. NICHOLS, *Pottery: How it is made, etc.*, 1878. HANCOCK, *Amateur Pottery and Glass Painter, with directions, etc.*, 8vo., 1879. MARRYAT, *History of P. and P., Ancient and Modern*, 4to., London, 1868, 3rd edit. BIRCH, *History of Ancient Pot.*, 8vo., 2nd edit., 1873. PRIME, *P. and P. of all times and nations*, 8vo., New York, 1878, which refers to 48 publications.

BUILDER *Journal*, 1858, xvi, 221, review of Birch's *Pottery*.

BIRCH, *Fictile manufactures*, read at ARCHÆOLOGICAL INSTITUTE, 1846, printed in CIVIL ENGINEER, ETC., *Journal*, ix, 178. *Majolica ware;* BUILDER *Journal*, 1856, xiv, 212; 236; and the Soulages collection, xv, 33; 93; xviii, 519; xxi, 526. *Art Treasures' Exhibition*, BUILDING NEWS *Journal*, 1857, iii, 544; 600.

POUGET, POUGHET, and PUJET (PIERRE); see PUGET (P.)

POULETTE (HUE or HUGUES), master mason 1386 at Amiens, and living in 1401. LANCE, *Dict.*, 1872.

POULTRY HOUSE and YARD. It should be so arranged that each kind of bird shall be separately lodged, and that all shall have access to an ample field, or yard, containing water and gravel. DUCK HOUSE. FOWL HOUSE. A poultry house, 140 ft. long, existed at Lord Penrhyn's seat, Winnington hall, Cheshire. AQUINUS, *Vocab.*, s. v. Gallinarium; and SMITH, *Dict. Ant.*, p. 66. LOUDON, *Country Residences*, 4to., 1806, ii, 595. *On Fattening Poultry*, prize essay, in YORKSHIRE AGRIC. SOCIETY, *Transactions*, 1854, p. 47. ALLGEMEINE BAUZEITUNG, 1854, pl. 651. BUILDING NEWS *Journal*, vi, 677. BLAIR, *The Henwife; her own Experiences in her own Poultry Yard*, 2nd edit., 1861. DEAN, *Essay on Farms*, 4to., London, 1849, p. 27. GEYELIN, *Poultry breeding*, 1866. 1. 2. 14.

POUNCED. Sunk work relieved by a continuous series of dots over the entire surface. A sort of POWDERING.

POUND NAIL. A nail square in the shank; it was *cir.* 1700 much used in the counties of Essex, Suffolk, and Norfolk, and but in few others, except for paling. The sizes were 6d, 8d, 10d, 20d, and 40d per lb. 4.

POUS; see FOOT.

POUSSIELGUE (EMILE), born 29 Nov. 1796 at Paris, published *l'Architecture légale*. He had the direction and inspection of the caserne de gendarmerie, rue Mouffetard, was inspector of public works, etc., and was living in 1831. 110.

POUTEE POWDER. White oxide of tin, used to give the finished polishing to alabaster, etc. PUTTY.

POUTRAINE, POULTRAIN and POWTRAN (MAXIMILIAN), more usually known as COULTE or COLT, who, by writ of privy seal, dated 4 March 1604, carved the tomb to queen Elizabeth in Westminster abbey, and was paid £170; Patrick, the blacksmith, £95; and John de Critz, or Crites, the painter, £100. The whole, with the stone, cost £965. WALPOLE, *Anecdotes*, edit., 1862, p. 195; 238. NOTES AND QUERIES *Journal*, 3rd ser., v, 434. DEVON, *Issues, James I*, p. 22, 27, 36, 50. He had a writ of privy seal in 1607 for £140; and £175 in 1608-9; British Museum, Addit. MS., 9045, fol. 48, for the tomb in the same edifice, for princesses Mary and Sophia, daughters of James I; LODGE, *Illustrations*, iii, 319; DEVON, *Issues*, p. 60; 88; 289. His livery 1608 is recorded Addit. MS. 5755, fol. 233. He was master sculptor in the king's board of works at £8 per annum in 1633, *temp.* Charles I. He lived in S. Bartholomew's close; his wife Susan died 1645; had a daughter Abigail died 1629, and a son John, 'stone cutter': there was another son Alexander. His own death appears unknown. W. P.

POWDERING. A term in decoration for a ground which is covered with a repetition of the same forms—patterns are given in BUILDING NEWS *Journal*, 1867, xiv, 491—similar to DIAPER. In heraldry, when the field, crest, or supporter, is promiscuously strewed over with minor charges, as mullets, crescents, or *fleurs-de-lis*. The Fr. term *semée* has been lately adopted by English heralds to express this powdering. POUNCED.

POWDERING ROOM. A room set apart and having no communication with the other apartments, shown in plans of large houses built from the early part of XVIII century, wherein persons had their hair powdered according to the fashion. One is shown in RICHARDSON, *New Vit. Britt.*, fol., 1797, pl. 17.

POWDER MAGAZINE, or STORE. A fireproof building erected to contain gunpowder in bulk. CORPS OF ROYAL ENGINEERS, *Papers*, new ser., xii, 40. ALLGEMEINE BAUZEITUNG, 1849, pl. 256-61. CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 120; 304. BUILDER *Journal*, 1874, xxxii, 923, near Liverpool. Instructions for protecting it from lightning are given with Army circulars, dated 1 May 1875. PAPWORTH, *Explosions of Gunpowder Stores*, in BUILDER *Journal*, 1865, xxiii, 761. 14.

POWER. ANIMAL or HORSE POWER; MAN POWER: and mechanical power. 14.

POWER, or moving force, in mechanics. The six simple machines, viz., the lever, balance, screw, wheel, wedge, and pulley, causing motion; and there is also the sustaining and regulating power, in machinery.

POWLE (ADAM), "of Blythchurgh with Richard Rupel of Donewich, masons", contracted 1426 to build the 'stepel' to Walberswick church, Essex; GARDNER, *Hist. of Dunwich*, p. 145; NICHOLL, *Illust. of Manners, etc.*, 1797, p. 183; 189.

POYET (BERNARD), born 3 May 1742 at Dijon, was a pupil of de Wailly and of Regemorte. He gained 1768 the second *grand prix*, and while studying in Italy was employed by baron Talleyrand, French ambassador at Naples, with the directions for important *fêtes*. On his return to Paris, he commenced rebuilding 1778 or 1786 the church of S. Sauveur, stopped at the revolution. He moved 1788 to the marché des Innocens, and rebuilt, the fountain of Jean Goujon (MOLINOS); LEGRAND ET LANDON, *Descr.de Paris*, 8vo., Paris, 1808, iii, 72, pl. 22; pulled down all the houses erected upon the bridges; designed the stables for the duc de Chartres, rue S. Thomas du Louvre; the dodecastyle portico of the Corinthian order, to the palais de la chambre des députés; LEGRAND, ii, 71, pl, 44; with other works as architect to the city, to the duc d'Orléans, to many ministers; to the archbishop of Paris, for whom he restored the palais; to the University, and others, for whom he made many designs not carried out; such as for the hôtel Dieu, HUSSON, *Etudes sur les hôpitaux*, 4to., Paris, 1862, p. 28; for hôpital at la Roquette, TENON, *Mémoires sur les hôpitaux*, 4to., Paris, 1788, pl. 14; for a central hospital at Paris, pl. 62-3; and for a lunatic asylum, pl. 15. LEGRAND, iv, pl. 46, gives 'maison Callet', 1775, in the rue du Mont Parnasse. The écurie de l'archevêche next to Nôtre Dame, is given in KRAFFT, *Choix de Maisons*, fol., Paris, 1838, pl. 88-9. A roof at the hôtel of Lucien Buonaparte, in KRAFFT, *Charpente*, fol., Paris, 1805, pt. 2, p. 17, pl. 43. NORMAND, *Paris Moderne*, 4to., Liege, 1846, pt. 1, pl. 6. He published *Mémoires sur la nécessité de transferer, etc., l'hôtel Dieu, suivi d'un projet*, 4to., Paris, 1785; with *Supplement*, 4to., Paris, 1786: *Tellès d'Acosta, hospices royaux*, 4to., Paris, 1789: *Projet d'une nouvelle salle d'Opera*, 4to., 1817: and *Nouveau système des ponts en fer forgé et en bois, inventé par P.* He was 1786 a member of the academy of architecture; 1818 of the académie royale des beaux arts, and of the conseil des bâtimens civils. He died 6 or 7 Dec. 1824, aged 76 years. VAUDOYER, *Eloge*. PRUDHOMME, *Miroir*. DALY, *Revue Générale*, 1840, i, 26, Poyet's suspension bridge principle (similar to that later by Dredge); xiv, 136; and xx, 183. LANCE, *Dict. Biog.*, 1872. 110.

POYNTEL, poyntil, or pointel. A floor set into squares or lozenge forms, generally composed of brick, and common in halls and cloisters. "Ypaved with poyntill eche point after other"; *Piers Plowman's Creed*. 17. 19.

POZNAN (anc. *Setidava;* Ger. and Engl. *Posen;* Ital. *Posnania*. The ancient seat of the dukes of Poland until 1296; and since 1815 the capital of the province of the same name in Prussia; situated on the rivers Warta or Wartha, and Lowna or Loyna. The fortifications of the first class and the detached forts were constructed since 1828. It is the see of the archbishop of Poznan and Gnesen. The cathedral, dedicated to SS. Peter and Paul, is a modernised edifice of 1725; has four large brasses to the de Gorta family 1475, etc.; and 1842 the rich Golden chapel (Byzantine) was added. There are four parish churches, of which S. Stanislaus by the Jesuits is considered a masterpiece of Italian architecture; a fine *rathhaus* (called Sclavonic romanesque) 1512-30, with a tower 1730; the stadt theatre 1836; the Raczinsky library of 20,000 volumes; and a large number of modern public edifices, and mansions of the Polish nobility. 14. 28. 50. 96.

POZO (JUAN DEL), canon of Cuença cathedral, founder of

the Dominican monastery (rich Gothic) of S. Paul near that city, *cir.* 1450, is considered the designer of the celebrated bridge over the river Huexar, near the convent. It has five arches, is 350 ft. long, and the middle piers 150 ft. high. He was buried in the transept of the church of the monastery, the statue being a sitting figure. PONZ, *Viage de España*, 18 vols., 16mo., Madrid, 1787-94. 3. 68.

POZO (PEDRO), a relative of the above, designed the monastery of the Jesuits at Cuença, now of the Interpreters. 3. 68.

POZZI (PAOLO), restored 1783 the palazzo del Tè, designed by Giulio (Romano) Pippi; and restored 1800 that artist's house in via Larga, at Mantua, for L. Mambrini.

POZZO (ANDREA), born 30 Nov. 1642 at (Ger.) Trient, or (Ital.) Trento, became a Jesuit at 23 years of age; was also a painter more especially in perspective. He published *Prospettiva de' pittori e architetti*, or *Perspectiva pictorum et architectonicum*, 220 pl., full of absurd designs, 2 vols., fol., Rome 1693-1700; with later editions; transl. in German by BOXBARTH and BODDENER, fol., Augs., 1706, and 1719; in English by JAMES, *Rules and Examples of Perspective, proper for Painters, Architects, etc.*, 105 pl., fol., 1700; 1707, 105 pl. by J. Sturt. He designed many things at Rome, especially the sumptuous chapel of S. Ignazio in the church del Gesù; (LETAROUILLY, *Rome Moderne*, p. 419); that of S. Luigi Gonzaga in the church of S. Ignazio of the Jesuits college, and in which church he executed some paintings (LET., p. 373); works at the former Jesuit church at Trient; at Verona, the high altar of S. Sebastiano de' padri Gesuiti, and the church of the Annunciation of the Virgin de' padri Scalzi (*Verona, etc.*); the church of the Jesuits at Belluno, since used as a barrack; and the church of the Badìa di Sta. Flora at Arezzo, which is remarkable for the architectural painting on its cupola by Pozzo. At Vienna, where he executed some paintings in fresco, as the dome of the pfarrkirche, and of the universitatskirche, he remodernised the churches of the casa professa della Compagnìa; those of the Misericordia, of the Riscatto, la Mercede, and others. He died at Vienna in 1709, aged 67 years. *Verona; Notizie*, 8vo., Verona, 1795, p. 63; 92. 3. 5. 25. 26. 28. 30. 68. 111.

POZZO (BELTRAMO DEL), was employed 1409 upon the works at Milan cathedral. 27.

POZZO (conte GIROLAMO DEL), born 1718, of Verona, was a pupil of don P. and don G. Ballerini, and a follower of Palladio and San Michele. He designed the villa for count Trissino in the Vicentino; a small church in the marquisate of Castellaro, on the Mantuan river; and a number of other edifices; and the scenic part of a small theatre for the hall of the Philharmonic academy at Verona (given on the title-page of the tragedy "Il Medo"). He published *Degli Ornamenti dell' Architettura Civile secondo gli Antichi*, 8vo., Rome, 1768; and *Sopra i Teatri degli Antichi e sul idea d'un teatro adatto all' uso Moderno.* He was an associate of the academy at Parma, and of the Clementina at Bologna; and died 1781. *Vite de' più celebri Archit. Rom.*, p. 474. 3. 25. 68.

POZZO (LORENZO), of Trient, a Carmelite monk, was a brother of Andrea Pozzo; he flourished 1675-1700, and carved the high altar in the chiesa degli Scalzi at Venice (1649-89), by B. Longhena; the high altar in the pfarrkirche at Botzen (Ital. Bolzano); and that of the Carmelite church at Trient. GIUSEPPE POZZO, carmelitano scalzo, designed two side altars in the duomo at Udine, as noticed in MANIAGO, *Guida*, 8vo., San Vito, 1839, p. 28; and *Storia*, 2nd edit., 1823, p. 145; he is possibly the same person as Lorenzo Pozzo. 26. 68.

POZZONI (FRANCISCO FELICE), restored the church of S. Sebastiano, Valentino, and Anna de' Funari, at Rome; TITI, *Ammaest.*, 8vo., 1686, p. 77. 111.

POZZUOLANO, pozzolana, pouzzolano, and puzzolana. A burnt clay, of a reddish or reddish-brown colour, sometimes yellow or grey; and even white, which is a sort of powdered pumice. VITRUVIUS, ii, 6, mentions the "genus pulveris" as found at Baiæ and around mount Vesuvius; the words of the heading of that chapter "De pulvere Puteolano" do not appear in the MSS. earlier than XIV (?) century; but the "pulvis puteolanum" seems to be mentioned in SENECA, PLINY, and the *Compendium.* GALLIANI states that the ashes from Vesuvius after a time are converted into pulvis puteolanum, the pumice into *lapilli*, and the two materials with water into (tophus) tufo; VIT., STRATICO, *Exercit.* iii, POLENO, *Mem. istoriche*, Utini, § 107, 117. Around Rome and Naples, and in other parts of Italy, are vast beds of this arenaceous substance. It is a very close and compact body of sand mixed with a sort of burnt argillaceous matter in granules very much resembling powdered brick. This material varies much in hardness and quality, which may account for the irregularity of the passages in the catacombs at Rome, the workman turning, as the material was easier or more valuable; and unless water has got amongst it, there is scarcely an instance of the roof or walls of an excavation falling in. It also contains frequent masses of *tufo*, in which the *cubicula* or crypts proper are generally excavated; ASHPITEL, in Royal Institute of British Architects, *Sessional Papers*, 1859-60, p. 142. The pozzuolano of Naples is a decomposition of TUFA or indurated black mud deposited by the eruption of Vesuvius, 29 Sept. to 5 Oct. 1538, which also produced monte Nuovo, about a mile to the west of Pozzuoli. The stream, charged with pumice, ashes, and (lapilli) small stones, arose like a thick black cloud, condensed in the atmosphere, and fell in a shower, and was carried even as far as Naples. Catacomb, in SMITH, *Dict. of Christian Antiq.*, 1876, gives a good account of the different strata.

The following analysis of the material was given by prof. ANSTED in his Cantor lectures at the Society of Arts, 1865. Another by Berthier, in GWILT, *Encyc.*, 537.

Silica	44·5	Iron oxide	12·0
Alumina	15	Potash	1·4
Lime	8	Soda	4
Magnesia	4·7	Water	9·2

1 part of pounded lime to 2½ of pozzuolano, or 1 lime to 1 of sand and 1 of pozzuolano, are the proportions recommended by French writers.

"Of itself, pozzuolano has no cementing properties, it having been found, when analysed, to consist of the same component parts as the coloured clays of nature, that is chiefly of silica and alumina, with a small proportion of the metallic oxides, and sometimes also with a trace of lime; but when mixed with the weaker hydraulic limes, or even with common lime, it constitutes a hydraulic mortar, that sets under water, certainly much more slowly than either the natural or artificial water cements;" PASLEY, *Cements*, 1837, p. 182, who notices that Smeaton was the first to use it in England; and gives a table of the various mortars comprising pozzuolano used by him. The best pozzuolano for mortar is obtained from the caves near the church of S. Paolo at Rome; it is taken by waggons to the river Tiber, thence by barges to Civita Vecchia, and so exported (HYDRAULIC MORTAR); the pieces vary in size from that of an egg to the smallest grain of sand. It was found, in the works at Algiers after 1832, that only the very finest grains could be used with effect; its efficacy and quickness in hardening were in proportion to the fineness. The material as brought was sifted, and the residue, about one half, was ground in a mill and again sifted, but its quality was found inferior to the first portion: hence it was sifted first at Rome to save the expense of transit. The mortar was made of one part lime in paste and two parts pozzuolano. When in a rough state, the mortar becomes hard in 4 days; when sifted through bolting cloths, in 2 days; and if sifted through a fine hair sieve, in 24 hours. One part of lime, one of bolted pozzuolano, and one of sand, mixed as mortar, takes 6 days to become hard; POIREL, *Hydraulic Works at Algiers*, in ANNALES DES PONTS, etc., translated in CIVIL ENGINEER, ETC., *Journal*, 1840, iii. 265-7.

An "artificial pozzuolano", superior or at least equal to the best Italian, may be obtained by using clay of the purest sort. BRICKDUST MORTAR. TRASS. The clay is to be slightly calcined to drive off the water of combination, always keeping the temperature between 600° and 700° centigrade, or 1.112° to 1.292°

Falr.; as stated by VICAT, *Cements, etc.*, transl. by SMITH, 8vo., London, 1837. Others are mentioned in PASLEY, *Cements*, 8vo., London, 1838. Puzzolana, § 20; and 247, etc.; edit. 1847; CLEGG, *On Poz.*, in CIVIL ENGINEER, *etc., Journal*, 1852, xv, 54; and REID, *Treatise on Concrete*, 8vo., London, 1869, p. 15. BRARD, *Minéralogie*, 8vo., Paris, 1821, ii, 121-50, s. v. pouzzolanes. URE, *Dict.*, s. v. Mortar. S. FOND, *Pouzzalane*, 8vo., Paris, 1780. *Natural and Artificial Pozzuolana*, by L'ELSLER, is reviewed in BUILDER *Journal*, 1874, xxxii, 800; 833. DALY, *Revue Générale*, v, 284; vi, 16, 55; xi, 86. SANTORIN. A red earth from Jamaica is recommended in SOCIETY OF ARTS, *Transactions*, 1774-84, v, 215. 1. 2. 25. 28.

POZZUOLI (*Puteoli* of the ancient Cumæans; subsequently *Dicæarchia*; Puteoli of the Romans; Fr. *Pouzzol*). An ancient town near Naples in Southern Italy. It was plundered by Alaric and others; destroyed later by other nations, earthquakes, subsidence of the land, and eruptions of mount Vesuvius. Amongst the numerous remains are the AMPHITHEATRE (its size, which as given s. v. from TEXIER, makes it larger than that at Rome, but) the *Handbook* gives the size as 480 ft. by 382 ft., and of the arena 336 ft. by 138 ft., being larger than that at Pompeii and smaller than that at Capua; (REAL ACCAD. ERCOLANESE, *Memorie*, 4to., Nap., 1852, iv, pt. i, 240); the substructures when exposed 1838-42 showed vast works even under the arena itself (at Capua is another example); some portions of a theatre; of the stadium, also called circus, and villa of Cicero; temple to Neptune; temple of the Nymphs; the labyrinth, cento camerelle, or piscina, in the villa Lusciano; villa Licastro; but above all these are the ruins of the temple to Jupiter Serapis, or the Serapeon, known in 1538 and rediscovered 1750; they consist of a quadrilateral atrium 140 ft. by 122 ft. surrounded by a colonnade and by chambers; in the centre was a monopteral temple 3 ft. above the pavement, and of which sixteen columns of African marble were removed (WOODS appears to have seen them *in situ* in 1817, and considered they only formed a screen) to decorate the theatre in the palace at Caserta. The three standing columns of the pronaos of the temple are of cipolino, each 40 ft. 3 ins. high, which, with the pedestals of others exhibit the various changes that have occurred in the level of the coast. NIXON, in PHILOSOPHICAL TRANSACTIONS, abr., 1757, xi, 106. BABBAGE, *Obs. on the Temple of Serapis, etc.*, 8vo., London, 1847. ROMANELLI, *Viaggio*, 8vo., Naples, 1817, pt. ii, p. 129, states that an inscription recorded the erection of the temple in the seventh century of Rome. Certain columns were set up as stated in ATHENÆUM *Journal*, 1855, p. 1087, 1313; and in BUILDER *Journal*, 1855, xiii, 490. The mole or ponte di Caligola, in existence before II cent., is formed on brick arches for the flow of water under it. A senatorial statue found 1704, now in the market place, has a modern head. A hundred good Roman tombs have been found on the via Campana leading to Capua; others of great interest, near Salvaterra, on via Puteolana or Antiniana leading to Naples; and others on the via Cumana leading to Cumæ.

The cathedral dedicated to S. Proculo was formed 1538 in the temple, of the Corinthian order, to Augustus, designed by L. COCCEIUS AUCTUS as recorded (date unknown); MONIER, *Hist.*, 8vo., London, 1699, p. 67, names Califurnius as the architect of the temple to Augustus; and mentions the temple to Diana having had 100 Corinthian columns; and temples to Neptune and to Trajan. There are also two parish churches, and the fortified palace (decorated by pupils of Raphael) 1532-54 by F. Manlio, since 1750 used as a barrack. Blue, writes VITRUVIUS, vii, 11, was first manufactured at Alexandria, and afterwards by Vestorius at Puteoli. The best sort of PURPLE, as stated by some writers, used by the ancients came from Puteoli; NAPOLI, p. 13.

PORTIUS, *De Conflagratione agri Puteolani*, 4to. (1540 ?), only four leaves, and very rare, giving an account of the destruction of the town in 1538. LOFFREDO, *Antichità di P.*, 1580. FALCO, *Descr. dei Luoghi Antichi di N.*, 8vo., Nap., 1549; and later edits.; also 1617, and 1679. JORIO, *Guida*, 1830; PARINO, *Nuova Guida*, 1751; SARNELLI ED MUZIO, *Guida*, 1709. MORGHEN, *Antichità*, fol., 1769, 1803; PANVINI, 8vo., 1818; PAOLI, 1768, pl. 49-52; AVANZI, fol., n.d. SADELER, *Vestigi di Roma*, fol., 1606. MORMILI, *Descr.*, 8vo., 1670. CAPANI, *Hist. Neap.*, 1771, ii, 377. MAZZELLA, *Situs*, etc., in GRÆVIUS, *Thesaurus*, ix, pt. iv. ROME, *Voyage Pittoresque*, 1823-4, at end. GIRAUD, *Le Grand Golfe de Naples, etc.*, fol., Nap., 1771, pl. 10 and 19. *Antichità di P., Gaetano, Ancora*, 52 pl., 8vo., Napoli, 1792. DENNIS, *Etruria*, 8vo., London, 1848. NICOLAS, *Monumenti di Ant. in P., etc.*, Nap., 1812. BONUCCI, *Statement of Excavations, etc.*, 1830-49, in FALKENER, *Museum, etc.*, 8vo., London, 1860, i, 286. TATHAM, Drawings in South Kensington Museum Library. S. NON, *Voy. Pitt.*, fol., Paris, 1781-6, ii. 164. WOODS, *Letters*, 4to., 1828, p. 192-7. SWINBURNE, *The Two Sicilies*, 4to., 1783-5, iii, 59. 2. 6. 14. 23. 25. 28. 50. 96.

PRA-CHA DI, or PRAHCHADI, literally 'roof of the pra' or lord, and called DAGOBA or dagopa by the Buddhists of Ceylon, is, according to FINLAYSON, *Mission*, 8vo., London, 1826, p. 221, "a solid building of masonry, without aperture or inlet of any sort. It is generally built in the neighbourhood of some temple, but is not itself an object of worship; it is supposed to contain some relic of Buddha, as its origin would appear to be sepulchral." That of the temple called Waat thay cham poun, at BANGKOK, is said to be about 250 ft. high; and that of the temple called Prah-chat-ap-pan is 162 ft. high and 90 ft. square at the base. CRAWFURD, *Journal*, 4to., London, 1828, calls these tall edifices "pinnacles or spires"; p. 111; 138; 309.

PRACTICE of Architecture. A paper, by T. R. SMITH, *On entering Architectural practice*, is printed in BUILDER *Journal*, 1861, xix, 857; 872. 1. 25.

PRADAKSHINA; see PROCESSIONAL PATH.

PRADO (PEDRO DE), a native of Zaragoza, studied in Italy, where he was called DE PRATA. He was commissioned 1532-54 to rebuild at Naples the castle of S. Erasmo (also attributed to L. Scriva or Scrivano); as well as the magnificent chapel of the marquis de Vico, in the church of S. Giovanni a Carbonara in that city. He was also a sculptor. 65. 66.

PRÆCINCTIO. (Gr. DIAZOMA.) The wide step or landing-place in the ancient Roman theatres; BALTEUS. It was on the top of the principal præcinctio at Saguntum that grooves were found, supposed to be for ECHEIA.

PRÆFURNIUM. The Latin for the 'stokehole' of a heating apparatus; same as *propnigeum*. HYPOCAUSIS. 78.

PRÆMONSTRATENSIAN or WHITE MONKS, or regular clergy, were a reformed branch of the AUGUSTINIAN ORDER. They were established at Prémontré, near Coucy la ville, near Soissons, in France, where all the abbots of the order had to meet once a year; scarcely any remains of the buildings exist (STREET, in ECCLESIOLOGIST *Journal*, 1859, xx, 99). This order had thirty-five houses in England, among which were the following abbeys:—Alnwick, Barling, Bayham, Bileigh, Blanchland, Bradsole, Cockersand (has a small octagonal chapter house 1205), Coverham, Croxton, Dale, Easby S. Agatha, Dureford, Eggleston, Ferne, Hagneby, Hales Owen, Home Lacy, West Langdon, Lavenden, Leiston, co. Suffolk; Newboth, Newhouse or Neusham, Lincolnshire, 1143 or 1146 (the first in England, Shap, S. Radegund or Bradsole, Sulby, Talley, Tichfield, Welbeck, co. Nott., 1153 (the chief in England), and Wendling: Dunfermline and Dryburgh, in Scotland. Two of the most deformed ground plans in England belong to these canons; Easby abbey, Yorkshire, with its long aileless choir, and nave wanting a south aile; ASSOCIATED SOCIETIES, *Reports and Papers*, 1852-53, ii, 317: and Bayham abbey, with aisleless nave and lateral galleries to the transept, and an aisleless choir, but with a polygonal apse; BUILDING NEWS *Journal*, 1870, xix, 47. NOTES AND QUERIES *Journal*, 5 Ser., xi, 1879, p. 388.

Some foreign examples comprise, the remarkable abbey at Wilten or Wiltau, in Tyrol, with its majestic church, founded *cir.* 860: Frère François BUYRETTE, plan and view of a Præm.

monastery, engraved by frère Barbasson: the military chapel at Bruenn formerly a monastic chapel: a plan of an abbatial house at Villars Cotterets, designed 1765 by F. Franque, is given in BLONDEL, *Cours d'Arch.*, 8vo., Paris, 1783, iv, 357; and the church at Pont à Mousson, *cir.* 1730, by N. Pierson. The NORBERTINE MONKS were a branch of this order: S. Norbert is buried in the church of the monastery of Strahow at Prag, founded 1140. 60. 96

PRÆNESTE; see PALESTRINA, in Italy.

PRÆTORIUM. The place in the middle of a Roman camp (CASTRUM) set apart for the tent or pavilion of the generals (*prætor*) of the army and the emperor. A gold medal of Claudius represents the latter under his pavilion receiving as it were the allegiance of the army, in an elevated position to see and be seen, with the standard before him; and there are the usual four gateways to the camp distinctly marked in the circuit of the walls. Many camps are sculptured on the Trajan column, as illustrated by BELLORI, showing the various erections of which each was composed. DALY, *Revue Gén.*, 4to., 1844, v. 157. It was also the name of the palace of the Roman governor of a town or province. The term is still used in many towns in Italy, as palazzo pretorio. 23. 78.

PRAG (Engl. PRAGUE; Ital. Praga). The capital of Bohemia, situated on both banks of the river Moldau. It consists of five districts, each of which formerly had its own walls and gates, and of several suburbs. The bombardment of 1757 damaged many buildings, besides destroying 900 houses. The present Moldau bruecke replaces one erected XII cent., and destroyed 1343; the first stone was laid 9 July 1357 by P. Arler, and it was completed 1503 or 7; it is 1790 Vienna ft. long (1572 German ft. (28), or 1500 Engl. ft.), 35 ft. 6 in. wide, 40 ft. high above half-tide, with 16 arches, and has 28 statues and groups of saints, the best by Lazar Procof, sculptor; the bronze statue of S. John Nepomuk 1683 (drowned 1383); and 1696 a copper crucifix on a column. An ancient gateway tower at each end (west one, SHAW, *Arch. Sketches*, fol., 1858, pl. 91). WELLEBA, *Prager-brücke*, 1830. The Karlsdenkmal monument 1848 to king Charles IV, by Hähnel of Dresden, and cast by Burgschmiet of Nuremberg. Franzen bruecke (suspension), 1839-41, Schnirch, engineer. Franz Joseph bruecke (susp.) only for pedestrians, opened 21 June 1868, is by R. M. Ordish and Le Feuvre, 820 ft. Engl. between the abutments, 492 ft. between centre of towers; ENGINEERING *Journal*, Nov. 1867, p. 461; ARCHITECT *Journal*, 1869, i, 7, and 1870, iii, 234. The Kettenbruecke (suspension), ALLG. BAUZ., 1845, pl. 648.

I. The *Altstadt* district. The pulverthurm 1475; altstadt-thor, end of XV cent. (BUILDER *Journal*, 1866, xxiv, 541); Kleinseitethor (p. 850). Hauptpfarrkirche am Thein, founded 894; erected *temp.* Charles IV, 1407; vaulting 120 ft. high; largely altered; a spire to one of the two tall towers in B.J., 1865, xxiii, 693; there is a colossal crucifix coloured XIV cent. Mariahimmelfahrt am Thein, the protestant cathedral down to 1620; XI cent; finished 1460. S. Clemenskirche 1712-5; with the Walsche capelle 1590-97. Salvator-kirche 1578-1602 for the Jesuits, fine portail, *cir.* 1750 by F. M. Kanka, with statues by J. Geo. Pendel. Ejidiuskirche founded 1339, has later additions. Bethlehemskapelle in der postgasse 1391 (ALLG. BAUZ., 1845, pl. 648); pulled down 1787. Die kirche der Kreuzherren mit dem rothen Stern (Ionic), one of the most splendid; or priory of knights of Malta (near the bridge) 1662, and its church 1679, or 1672-88; are both by C. Lurago; the grandmaster's dwelling rebuilt 1847. S. Nicolauskirche for the Benedictines, 1690-1752 by K. I. Dinzenhofer, and the abbot's house, now containing the town archives. S. Gallikirche, in existence 1265, rebuilt 1740; the Carmelite monastery near it, 1671 by M. Lurago and D. de Orsis. S. Jacobskirche 1702 (Italian); the largest in the city. S. Bartholomaus and the convictorium for the Jesuits, and the seminarium near the church of S. Wenzel, *cir.* 1730 by K. I. Dinzenhofer.

Rathhaus, 1338; the tower and its chapel to S. Laurentius 1474; almost rebuilt 1786-7; Gothic façade rebuilt 1838-46 by Springer; six bronze statues of Bohemian monarchs (SHAW, *Arch. Sketches*, 1858, pl. 90). Universitätsgebaüde, or Carolinum collegium, founded 1348 (old German style); 1714-15 was almost entirely rebuilt. Clementinische collegium begun 1653 by the Jesuits, of two stories, and of large extent. The large and fine National theatre (1781-3 by Grafen Nostitz); rebuilt 1859; *concours* 1872 for the sculpture (DALY, *Revue Gén.*, xxix, 185; 267). Palast Goltz, later Kinsky, *cir.* 1750, by K. I. Dinzenhofer, carried out by A. Luragho. Clam-Gallast palast, 1712-19 by J. B. Fischers. The Marien säule 1648-50 by J. G. Pendel.

II. *Judenstadt* has nine synagogues. A very ancient cemetery is disused since 1787; one tomb said to date 606. The altneuschul or old synagogue, *cir.* 1290, burnt 1316, built 1336-38, partly rebuilt 1592, about 40 ft. × 30 ft. with two naves divided by two stone hollow columns and vaulted (ALLG. BAUZ., 1845, pl. 647; B. *J.*, 1866, xxiv, 850; SCOTT, *Plea for Restoration*, 1850). The Mieselschule and Jews' rathhaus, 1625.

III. *Neustadt*, formed 1348. Rossthor rebuilt 1831; Neu oder Wienerthor; Wissehraderthor; burgthor 1822-24 by P. Nobile, a Doric propylæum. Hauptpfarrkirche zu S. Heinrich, 1339; prot. 1420-1620; a Gothic crypt; and has a detached bell-tower. Stephanskirche, 1217, renewed 1612; a bronze font; and a small plain round Romanesque chapel (B. *J.*, 1865, xxiii, 693). Kirche zu S. Ignaz, 1633-90, with the Jesuit buildings, now a garrison hospital 630 ft. long. Kirche des heil. Johann von Nepomuk in Skalka, 1730-49, by K. I., or J., Dinzenhofer. Kirche Maria Schnee, 1347-97 by prior Herrmann, restored 1607; lofty vaulting. S. Ursula kirche, founded 1655-74; church 1704. Hieronymus kirche in Emaus, founded 1347 crypt; 1371 church; both renewed 1712. Carlshöfer prälatur mit der kirche zur Himmelfahrt Maria 1351, rebuilt 1652 (?); an octagon nearly 60 ft. diam. (ALLG. BAUZ., 1845, pl. 647; B. *J.*, 1866, xxiv, 850). S. Peter und S. Paul kirche, called the Zderaserkirche, with the probstei of the knights of the Holy Sepulchre, *cir.* 1730, by K. I. Dinzenhofer. Pfarrkirche S. Adalbert des Grösseren, 1348. Josephskirche, finished 1642. S. Peterspfarrkirche, before 1233. S. Apollinarius pfarrkirche, 1119; rebuilt 1362, collegiate. Piaristenkirche, 1766. S. Katharina kirche and Augustinian convent (also attributed to F. M. Kanka); the Elisabethinerunnenkirche and convent 1720; the Celestine nunnery in the Heinrichsgasse; the S. Carl Boromäuskirche used for military purposes, and Emeritenhaus; are all *cir.* 1730, by K. I., or a J., Dinzenhofer. Rathhaus 1348; completely rebuilt 1805-6, except a corner tower dating 1452. Hauptzollamtsgebaüde 1810-16, large and fine, formed out of a convent of S. Ambrosius; church 1652, now a magazine. Senate house. Bohemian national museum, library and collections, 1805-19 by P. Nobile, in imitation of temple to Theseus at Athens. Palaces of counts Auersburg; Piccolomini later Johann Nostitz, by K. I. Dinzenhofer carried out by A. Luragho; Thun, *cir.* 1660 by C. Lurago; Kinsky; Salm, and others.

IV. *Kleinseite* or Little Prag. Trinity obelisk and fountain 1713-15 by Aliprandi; Springbrunnen or fountain; statue of Radetzky, raised on his shield by eight soldiers, 1858, by E. and J. Max, cast in bronze by Burgschmiet of Nuremberg. S. Niklaskirche for the Jesuits, 1628, façade 1673 by C. Dinzenhofer, and completed 1752 by K. I. Dinzenhofer; interior is of marble; tower 248 ft. high; the crypt contains the national archives. Maltheserstiftskirche is ancient. Pfarrkirche Maria de Victoria, 1611-69. Pfarrkirche zu S. Thomas, Augustinian, XVIII cent. with older portions; 100 ft. by 50 ft. Kirche zu unserer lieben Frau von der Vorsicht, 1672, Theatine, by C. G. Guarini (or church of S. Maria von Alten-Oetting), secularised 1783. Königl. land oder Regierungshaus, formerly professorhaus of the Jesuits, 1726-73, much rebuilt 1845. Of the many palaces, that of Lichtenstein, later Ledebour, was 1848 the landes militar-commando-gebaude; and Wallenstein or Waldstein or Friedland pallast, 1629-32, by Giov. Batt. Marini of

Milan, was decorated by Adrien de Vries (ALLG. BAUZ., 1845, pl. 648).

V. *Hradschin*, on the schlossberg hill. Cathedral of S. Veit, begun 28 Nov. 1344 by M. d'Arras; Busco or Bauschek. archdeacon, is recorded as "primus fabricæ director obiit 1350"; the edifice was continued 1356-85 by P. Arler; 1380 A. Kotlik or Kottik was baumeister; 1757 it was damaged and then restored by Hager and Cramolin. It has three aisles; and is 188 ft. long inside, 159 ft. wide, and 102 ft. high. A southwest tower once 506 or 518 Vienna ft. high, was after a fire 1541 reduced to 314 ft.; in 1770 a domical termination was given to it. High altar dates 1630. There are twelve chapels, of which that of S. Wenzel, the patron saint of Bohemia, murdered 936, has the walls inlaid with rich stones forming borders to the paintings; its bronze statue 1532 is by P. Vischer of Nuremburg; the old font is a block of serpentine: and that of S. Johann Nepomuk (Nepomucenus, died 1383, canonized 1729); its shrine in front is of silver 1736 by Johann Joseph Wurth of Vienna; the rich silver embellishments 1746 by Seiz after Platzer's models; completed 1763 for the jubilee festival. Royal mausoleum 1589, under which several monarchs are buried, is of white marble by Colin of Mechlin. The schatzkammer contains the original plan upon which the church was intended to have been erected, 368 mass robes for priests, church plate, etc. WELLEBA, *Der führer*, etc., *der Merkw.—zu S. Veit.*, 8vo., Prag, 1833. SENNFF, *Die Domkirche*, fol., Prag, 1831. The splendid Marien schanzenkirche or Mariahilf for the cathedral chapter, 1757 by Paliary, finished 1761 by his son, was closed 1789, and pulled down 1791. Königliche Theresianische Damenstift, 1755 by A. Lurago or Luragho; statues at entrance carved by Platzer. Lauretokirche, 1626-7 finely built for a princess Lobkowitz, said to be an exact copy within and without of the church at Loreto; rich in church plate (ALLG. BAUZ., 1845, pl. 648). S. Georgskirche, Benedictine, very early Romanesque, XII cent.; crypt under chancel; a deep stone gallery at west end of nave, a triforium over north aisle, and no clearstory; exterior modernised except the two spires at the west end (ALLG. BAUZ., 1845, pl. 647). Collegialkirche zu Allerheiligen, 1271, restored 1580. Præmonstratensian monastery of Strahow, founded 1140 by S. Norbert (wherein he is buried); rebuilt 1579; library 108 ft. by 36 ft. wide, hardly equalled in Germany; is of polished walnut wood richly gilt, and contains 60,000 volumes and 1,000 MSS.: the seminarium 1637 by Z. Campion. Maria Geburtskirche, 1661, enlarged 1718, with stone statues by J. Biederl, is now pulled down.

Königliche schloss; a few portions, three towers dating 1333-53, with the Allerheiligenkirche, still remain: it was greatly rebuilt 1502-22, including the Huldigungsaal by B. Benesch; burnt a second time, it was 1541-76 restored. V. Scamozzi designed a Doric portail, portico or large portal, and the wing extending from the royal rooms to the Spanischensaal. For Ferdinand III (1637-58), Dionys Miseron united the then existing works into one edifice, continued *cir.* 1638 by C. Lurago or Lorago: continued *cir.* 1700-50 by A. Gunz; and completed *cir.* 1769-75 by A. Haffenecker: Maria Theresa (1745-80) giving it its present form. (Several views of it were engraved by Sadeler.) In the second court is the burgkapelle; and the fountain 1681 by Heidelberger. In the third court is 1373-78 the basin with the bronze figure of S. George and the dragon 6 ft. high, by Martin and Georg von Clusenbach; repaired 1526. Among the 440 or 600 apartments, the most celebrated is the Wladislawschesaal or Huldigungsaal 1502-22, 216 ft. long and 60 ft. wide, vaulted and without columns, considered to be only inferior to Westminster Hall (an interior view 1607 by Sadeler). In the gardens is the lustschlosschen 1534-36 by Ferrabosco, said to have cost 100,000 florins (ALLG. BAUZ., 1838, pl. 232-3; and 1845, pl. 648), and a metal fountain (pl. 234). A belvedere 1434 in the artillery parade (1845, pl. 647). The prince archbishop's beautiful palace and chapel of Johann der Taufer, 1764-5, by J. Wirch. Czernin'sche majoratshaus 1677 (Italian), very large stone building three stories high, with colonnades of thirty-two columns in front, grand staircase and finely decorated inside; was later the palace of prince Calloredo, and was extended 1845 by completion of one of its wings; pictures brought from Vienna; 1852 used as barracks. Schwarzenberg palast, 1545, old Florentine style, very large (ALLG. BAUZ., 1845, pl. 648). Sternberg'sche palast, now contains the picture gallery of the Bohemian society for the encouragement of the fine arts. Clam-Martinitz palast now artillerie spital. A tall marble column with an altar table at its base dates 1713.

In the *Wisschrad* suburb is the domkirche zu S. Peter und Paul, founded 1068 or 1088; restored 1420; renewed XVIII cent.; a tall tower remains. Also the arsenal. The S. Laurentius der templer jetziger S. Annahof, 1232-53 enlarged and house built; restored 1616, and secularized 1782; and capelle auf dem Laurentiusberge, *cir.* 1600, in ALLG. BAUZ., are not identified. The Barbarakirche, *cir.* 1515 by B. Benesch with M. Reyseck; desecrated 1784; the Dominican church of Sta Maria Magdalena, 1656-1709, completed by C. Dinzenhofer, pulled down 1789; Ursuline nunnery and church of S. Anna and S. Johann von Nepomuck, by K. I. Dinzenhofer; or the church 1720-28 by a J. Dinzenhofer, desecrated 1784. P. Eysen, 1588; J. G. Gottwigk 1656; J. Haljrzch (died 1759); F. Heger and son 1792-96; and J. Palliardi 1758; designed other works in this city, as stated under their names herein.

Prag; *Grundriss*, 1742. *Plan de P.*, by Le Sr. Jaillot, 1757. *Old View of P.*, Aust., by J. de Ram; another by C. F. Krieger. *Die Oesterrischische National Encyclopædie*, 1838. GRIESELS, *Neuestes Gemälde von P.* SCHOTTKY, *Prag, wie es war und wie es ist*, 8vo., 1831-32. SCHALLER, *Beschreibung der Stadt P.*, 8vo., Prague, 1794; 1797; 1798. *Prag in neunzehnten Jahrhunderte*, 27 views, 4to., n.d. OTTE, *Archæologie*, 8vo., Leipzig, 1854. HEGER AND SON, *Thirty plates of views*; the list of the edifices, etc., represented is given in MEUSEL, *Künstlerlexicon*, 8vo., Lemgo, 1808-14, i, 370. *Teatro e Prosceuia della festa teatrale intotulata constanza e fortezza rappresentata nel reale castello di Praga*, 6 pl., 4to., 1723. GERLE, *Prag und seine Merkwürdigkeiten*, 8vo., 1836. GLUECKSELIG, *Prag und desen Merkwürdigkeiten*, 12mo., 1856, gives a list of over forty desecrated churches *cir.* 1784. PODIEBRAD UND FOGES, *Altherthümer der Prager Josefstadt*, 12mo. (1856). *Huss Festival*, by RALSTON, in GOOD WORDS *Journal*, 1869 p. 839-47. PROUT, *Facsimilies of Sketches, etc.*, fol., London (1837 ?), gives five plates. BAEDEKER, *Guide*. SCHIESSLER, *Neues Gemälde, etc.*, 12mo., 1834. ALLGEMEINE BAUZEITUNG, *Old Architecture in Prague*, 1845, pl. 647-8. BUILDER *Journal*, 1864, xxii, 456, a fine Byzantine door discovered; 1866, xxiv, 541, 850.

The railway from Olmutz to Prague and its station are delineated in ALLGEMEINE BAUZEITUNG, 1845, pl. 702-9. The truly regal castle of Karlstein, the Windsor of Prague, about seven miles distant, is fully described in *Handbook*; it was begun 1348, by Mathias von ARRAS, and completed 1353; it is now abandoned. 14. 26. 28. 40. 50.

PRAHCHADIS; see PRA-CHA-DI.

PRAHU; see GUNUNG DIENG, in Java.

PRAMBANAN; see BRAMBANAN.

PRANDAUER (JACOB), of S. Pölten, born 1707, designed or continued 1719-36 (said to be begun 1701-18), the palace-like Benedictine abbey for ninety monks at Melk or Moelk, in Austria, and repaired after a fire of 1738; and completed, especially the interior, by his pupil Franz Munkenoss or Mungenast. The bodies of Leopold I of Austria, and of his five immediate successors, were reinterred 1735 in the new monastery, which is still incomplete. At Herzogenburg, he partly designed 1742, the chorherrenstift of the Augustinians, still unfinished; and Dürrenstein, a similar edifice; the monastery is now 1782 dissolved, and the church attached to a parish. Also another edifice at S. Florian, built by baumeisters Michael and Jacob Steinhuber; the church is by C. Carloni; the portal dates 1700 Prandauer died 1736. 26. 28.

PRATA (Maffiolo de), is named 16 April 1411 in the list of those engaged on the works at Milan cathedral. 27.

PRATA (de); see Prado (P. de).

PRATO. A town of Tuscany, in Northern Italy. The ancient walls are fine; the castello dell' imperadore was erected *temp.* Frederick II. The *duomo* dedicated to S. Stefano, and begun 1312 (Italian Gothic), is attributed to Nicola Pisano. In 1317 his son Giovanni enlarged the choir, and added a new facing; it was completed about 1450 after his design; the edifice was thoroughly repaired before 1851. The capella della sacra cintola 1317 by G. Pisano, is separated from the nave by a curiously engraved and chiselled brass screen; Bianchini, *Not. ist. alla Cintola*, Fir., 1722. The circular pulpit or gallery on the façade is by Donatello (b. 1383, d. 1466), the canopy is perhaps of later date. The arches of the choir and nave are circular. The circular cinque-cento pulpit is by Rosselino and Mino da Fiesole. The six-storied party-coloured campanile 1317 by G. Pisano, was completed about 1340 by N. di Cecco del Mercia and his son Sano; *Detached Essay*, Campanile, p. 4: view in Fergusson, *Ill. Handbook*, 1855, p. 786; from Wiebeking, *Monumens*, fol., Munich, 1839-40. A view of another Lombard tower is given in Building News *Journal*, 1879, xxxvi, 506. The monastery of S. Domenico was restored 1200 by G. Pisano; the church 1281 is attributed to Ristoro da Campi and Sisto da Firenze; also said to be 1281-1300 continued by fra P. Pilastri, and about 1300 by fra Mazzetto; it was not completed in 1322; Marchese, *Lives*, 1852, i, 32. The nunnery of S. Nicolo 1200 is by G. Pisano (Vasari). The church della Madonna delle carceri, 1485-89, on the plan of a Greek cross is by Giuliano (Giamberti) da San Gallo; Francesco was employed 1528; the fine high altar is by A. da San Gallo. Church and monastery of S. Vincenzo are modern. Church del' Arcieri, has polychromatic decoration attributed to Luca della Robbia, by Barbet, but altered at the end of xv or beginning of xvi cent.; Daly, *Revue Générale*, 1857, xv, 40. The palazzo pretorio, formerly the palazzo Guazzagliotri (Gothic), is injured by adaptations for a prison. There are also the collegio Cicognoni (Italian); and a theatre dating 1830. Webb, *Cont. Ecclesiology*, 1848. *Illustrations*, Doorway. Near the city is La Doccia factory for porcelain, Builder *Journal*, 1866, xxiv, 538. A chapel by the side of the road to Florence, is by B. da Majano, *cir.* 1490, on an estate he had purchased. 28. 50. 96.

The verde di Prato is a serpentine of a deep green and black colour (from near Monferrato), which with Carrara marble, or pietra Albarese of a whitish tint, and a reddish sandstone, form the natural polychromatic work of many edifices of the town and others adjoining. Polychromy; natural.

PRATO (Luigi), designed 1830 the teatro Diurno at Genoa for 3,000 persons.

PRATS (don Josef), born 1726 at Barcelona, was chiefly a sculptor. His design was selected in competition for the chapel of S. Tecla in the cathedral of Tarragona, and was completed in 1775 or 1788 by him; he received 6 March 1774 the title of académico del mérito of S. Fernando; made many designs for churches and bridges; restored the Roman aqueduct; was engaged on the construction of the royal highroads of Catalonia; established himself at Barcelona; went to the Isle de Leon as director of the works; and where, after having designed and commenced the church and the quarters of the marine guards, he died 1790, aged 64 years. 66.

PRATT (.....), designed Clarendon house, Piccadilly, for Edward Hyde, earl of Clarendon; Evelyn, *Memoirs*, ii, 168; the grant is dated 13 June 1664; Pepys, *Diary*; Cunningham, *Handbook to London*, 8vo., 1850, p. 64 and 123 (Old Bond Street, built 1686, occupies part of the site): and he designed Horseheath, Cambridgeshire, for lord Allington, finished before 1670, costing about £20,000; Evelyn, *Memoirs*, 20 July 1670: it was possessed by lord Montford, *temp.* George II, and under lord Thomas the house was sold and pulled down before 1800.

PRAVES (Diego de), directed the work in the palace at Madrid for king Philip III, from the designs of F. de Mora. In 1607 he succeeded P. de Mazuecos as *maestro mayor de las obras* at the record office at Simancas; at the royal residences in the environs of Valladolid; and at the castle of Burgos; took part in the erection of the cathedral after the designs of J. de Herrera; and died in 1620. The cathedral at Cordoba was finished presumably on the advice of de Praves who was consulted 1597 thereon. 66.

PRAVES (Francisco de), succeeded to the posts held by his father Diego, and was appointed 1626 inspector and auditor of the royal palace, architect to the king, and *maestro mayor* of those works. He published *Lib. de la Arquitectura de Andreas Palladio*, Val., 1625. In 1631 he designed the new apartment in the convent de la Merced at Valladolid, from the refectory to the cellars; and to him is attributed the porch of the Doric order to the parish church of S. Martin in that city. He died in 1638. 66.

PRAW. The term for a temple in Ava; see Pra.

PREACHING or BLACKFRIAR; see Dominican building. *Notes on the Churches of the Friars Preachers*, in Gentleman's Magazine, February, 1862.

PREACHING CROSS. A sort of open pulpit, and generally placed in the immediate vicinity of a church. It was sometimes used as a place of public penance, but a variety called a "weeping cross' was used for that purpose alone. Those still remaining are;—at Hereford attached to the Blackfriars monastery (Britton, *Pict. Antiq. of English Cities*); at Iron Acton, Gloucestershire, *temp.* Henry IV (Britton, *Dict.*, 1838, pl. 1, Cross, fig. 6); at Holbeach, Lincolnshire; Bisley churchyard, Gloucestershire; and that now in the grounds at Stourhead, Wiltshire, formerly on the College green at Bristol; but the most noted example was that of S. Paul's, in London, chiefly of timber; Longman, *Three Cathedrals*, 8vo., 1873: its foundations were discovered 31 March 1879 by F. C. Penrose, fabric surveyor; Church Builder *Journal*, 1879, p. 217; 230; from Builder *Journal*, xxxvii, 777; 861. In the Fabric rolls of Exeter cathedral are entries of payments 1318-25 for 4 columns, bases, sub-bases, and capitals, several great bars of iron, 243 ft. of marble steps, and 2000 tiles, *pro la pulpytte*, which was a distinct building on the north side of the church, where lectures and sermons were occasionally delivered; Britton, *Cath. Antiq., Exeter*, 4to., 1827, p. 91: Oliver, *Exeter*, 8vo., 1861. p. 382. 19.

PREBENDAL HOUSE. One dating about 1241 exists at Thame, Oxfordshire. In 1837 it consisted of a chapel, and two ranges of apartments, in one of which was a large hall or refectory; this was taken down, and the remainder modernised with additions by H. B. Hodson; Builder *Journal*, 1847, v, 436. Its original character is shown in Skelton, *Oxfordshire*. The staircase by Inigo Jones in one of the prebendal houses at Westminster, is given in Britton and Pugin, *Public Buildings of London*, 8vo., 1825-28.

PRECEDENT. Boult, *On the Value of Precedent in Architecture*, read at Liverpool Arch., etc., Society, *Proceedings*, 4to., Liverpool, 1852, i, 119-30.

PRECEPTORY. The knight Templars placed upon many of their manors and estates small societies of their brethren, each being under the government of a *præceptor*, and subordinate to their temple or principal house in London. It corresponds with the commandery of the knights Hospitalers. When the latter body succeeded 1312 to many of the possessions of the former, they in some cases adopted the name of preceptory. Latham, *Stydd Chapel and Preceptory, Lancashire*, 15 pl., fol., 1853. Burton, *Mons. Ebor.*, fol., York, 1758, p. 63. Taylor, *Index Monasticus*, fol., London, 1821. Phillimore, *Burns' Eccles. Law*, 1842. Wheater, *Temple Newsam, the ancient preceptory, etc.*, 12mo., Leeds, n. d. 2. 19.

"Besides the House of the Temple in Mid Lothian [(on the Southesk, its original name was Balantrodach, according to Chalmers), the headquarters of the Grand Preceptors of Scotland, in the xv cent. the name was changed to the barony of St.

John], the following establishments or priories may be enumerated, S. Germains in East Lothian; Inchynan in Renfrewshire; Maryculter in Kincardineshire; Aggerstone in Stirlingshire; Aboyne in Aberdeenshire; Derville or Derval in Ayrshire; Dinwoodie in Dumfriesshire; Red abbey stedd in Roxburghshire; and Temple Liston in West Lothian;" LAURIE, *Hist. of Freemasonry*, edit. 1859, p. 77.

When Ste. Vaubourg, near Rouen, passed from the templars it served as the residence of the grand prior of the hospitalers in Normandy until 1789; the church XV cent. was equal to that at Moulins; and the cloisters in the style of that at Bocherville, XI cent.; the ruins 1794 have been engraved; and a view in *L'Artiste Journal*, 4to., Paris, 1838, ii, 54. Chapelle de la commanderie de S. Jean de Latran, at Paris; LENOIR, etc., *Statistique Mons. de Paris*, 4to., Paris, 1835. Com. de S. Jean de Jérusalem, XIII cent.; DRUMMOND, *Voyages au Levant*, fol., pl. 7; SEROUX D'AGINCOURT, *Architecture*, pl. 26, No. 25. The lofty campanile of the palazzo Doria, near Perugia, once a preceptory, dates early XIV cent.

PRECINCT. The arrangement both of a capitular close belonging to the secular canons, and of the conventual precinct of Benedictine, Cistercian, and Clugniac monks, the Augustine and Præmonstratensian canons, and the friars, with incidental notices of the uses of the several buildings, form the subject by WALCOTT, *Precinct of a Gothic Minster*, read at the Architectural Museum, and printed in BUILDING NEWS *Journal*, 1865, xii, 380, 407, and 453.

PREDELLA or GRADINO. The Italian names for the step or longitudinal border on the top of the altar, forming the base of the altar-piece, and on which are depicted in three or five tablets, events in the life of the saint represented in the picture above it. Thus, fra Angelico's *chef d'œuvre*, now in the Louvre, the coronation of the Virgin, has a predella representing the life of S. Dominic.

PREEDE (HENRI VAN); see PÉ (H. VAN).

PREGLIASCO (J.....), of Italy, of great celebrity as a theatrical architect, scene painter, and landscape gardener. Among his chief works are, the park of the princess Carignano; the repairs and alterations to the theatre la Canobiana at Milan; most of the scenery for the mythological ballets of Vigano and Gioja; the restoration of the great theatre at Naples; and of that of Monza; besides several theatres and gardens in Piedmont. He died Dec. 1826, aged 68. ANNUAL REGISTER, 1826, p. 219.

PREHELLENIC WORK; see PELASGI; and POLYGONAL MASONRY. FREEMAN, *Hist. of Arch.*, 8vo., London, 1849, p. 35; 103-4. FERGUSSON, *Illust. Handbook*, 1855.

PREHISTORIC ANTIQUITIES. Besides the publications named s. v. LACUSTRINE DWELLINGS, may be noticed: ACKERMANN, *die Indogermanen, oder des weissen Menschen Kampf gegen den Weltenforst*, 8vo., Thurm, 1870. FERGUSSON, *Rude Stone Monuments in all Countries*, 8vo., London, 1872. DAWKINS, *Cave Hunting; respecting the Early Inhabitants of Europe*, 8vo., 1874. LARTET AND CHRISTY, *Reliquiæ Aquitanicæ; Archy. of Perigord*, 4to., 44 pl., Paris and London, 1865. LE HON, *L'Homme fossile*, 110 cuts, 8vo., Brux., 1868. KEMBLE, *Hora Feralcs; Studies in the Archy. of the Northern Nations*, edited by Latham and Franks, 34 pl., 4to., 1863. LINDENSCHMIT, *das Germanische Todtenlager bei Selzen in der Provinz Rheinhessen*, 17 pl., 8vo., Mainz, 1848. WILSON, *Archy. and Prehistoric Annals of Scotland*, 201 pl., 8vo., Edinb., 1851. WORSAAE, *Primeval Antiq. of Denmark*, transl. and *applied to similar remains in England*, by Thoms, 8vo., 1849. WARING, *Stone Monuments, Tumuli, and Ornament of Remote Ages*, 4to., London, 1870. Prehistoric Archæology; International Congress, *Transactions*, 8vo., 3rd Session, Norwich, 1868; 7th Stockholm, 1876; 8th Budapest, 1877. Prehistoric and Ethnographical series of *photographs* from works in the British Musuem, selected by A. W. Franks, 157 pl., fol., 1878.

PREHISTORIC ART. BUILDER *Journal*, 1867, XXV, 481; 743; in Cornwall, 897. Fortifications, 1873, xxxi, 173. ZERFFI in SOCIETY OF ARTS, *Journal*, 1871, Feby.

PREMISES. In legal documents; a general word of reference to real or personal property described in the same instrument. In surveying, it is often used in reference to houses, or land, and comes to mean the house, houses, or lands set forth. Its use would seem to date from about 1750, although not in JACOB, *Law Dict.*, 4to., 1797.

PREMIUM; see GROUND RENT. 14.

PREMNA TOMENTOSA, Kolcuttay teak. A small tree with a hard and close-grained wood of a brownish yellow colour, well fitted for ornamental purposes.

PREMONSTRATENSIAN; see PRÆMONSTRATENSIAN.

PRENTICE WORK. A work executed in a building traditionally by an apprentice in imitation or emulation of his master. Such instances occur at Roslyn chapel (BUILDER *Journal*, xix, 326; BRITTON, *Antiquities*): a window at Lincoln cathedral (*Guide*, 1865, p. 103): a column there (WHITTINGTON, *Eccles. Antiq. of France*, 8vo., 1811): a window at S. Ouen in Rouen (WHITTINGTON, app.): a double staircase in tower Haram Velayet at Ispahan; (LANGLOIS CHARDIN, *Voyage*, vii, 445, 450): at Mtzkhetha (DUBOIS DE MONTPEREUX, iv, 242): the towers of Nancy and Bretteville l'Orgueilleuse, near Bayeux (MACQUOID, *Normandy*, 1874, p. 435). RAMÉE, *Hist. de l'Arch.*, 1843, ii, 160, 281, notices the death of bishop Conrad of Utrecht in 1099 killed by the father of one Pleber in consequence of that prelate having learnt the 'arcanum magisterium' from him. BUILDER *Journal*, xii, 341; NOTES AND QUERIES *Journal*, ser. 1, v, 395, 498; and x, 374.

PRENTYS (THOMAS), with Robert Sutton de Chelaston en counté de Derbie, Kervers, covenanted 1419 to execute an alabaster tomb in Luffwick church, Northamptonshire, for Katherine, wife of Rauf Greene, esq., at a cost of 40 livres desterlings. HALSTEAD, *Genealogies*, 1685, p. 189. HOARE, *Wiltshire*. WILLIS, *Nomenclature, etc.*, p. 79.

PRESBURG and PRESSBURG; see POSONY, in Hungary.

PRESBYTERIAN CHURCH. Owing to the absence of the communion table and to the other ritual differences, the plan of such a building varies much from an Episcopal church. The most noted Presbyterian church of the present day is that of Scotland, which is called the "kirk", where Presbyterianism was introduced about 1560 under John KNOX; and was reestablished by authority of Parliament at the revolution in 1688. The articles herein, such as EDINBURGH, GLASGOW, etc., refer to such erections. Dr. Hall's new church, New York, with lecture room in rear, by Carl Pfeiffer; plans, view, and description, in BUILDER *Journal*, 1876, xxxiv, 195. Three others in England are described, p. 648-9.

PRESBYTERIUM. A term very generally used with more or less indefiniteness, for part of a church. BONA (? *Rerum Lit.*, fol., 1747-53, ii, 103), mentions "tertia pars sanctuarium, sive sacrarium, vel presbyterium, complectebatur, quod erat sub apside cancellis vel parietibus conclusum; in eo altare majus eminebat" etc.; where the space so called clearly extends from the wall of the apse to the railing in front of the altar. This is supported by two passages in MARTENE, *Ant. Eccl. Rit.*, fol., Venice, 1783, i, 123; one being from the Council of Rome 826, and another from that of 964. BINGHAM, *Origines*, ii, 435; viii, c. 6; x, 423. But when the ceremonial apse was abolished, the term is thus noticed by DUCANGE, *Gloss.*, from Gervase of Canterbury, "de choro ad presbyterium tres erant gradus, de pavimento presbyterii usque ad altare gradus tres"; and in the celebration of holy matrimony in the Missal of Sarum, the rubric orders the spouses to stand, "in presbyterium scilicet inter chorum et altaro"; and in the Processional of the same place is "exeat processio per ostium presbyterii septentrionale circumiens presbyterium". Certainly the "gradus presbyterii" seem in the Sarum Processional and in the Consuetudines of the Canons Regular of S. Victor at Paris, to be the gradus chori,

i.e., the steps from the choir to the altar precinct. Ecclesiologist *Journal*, 1849, ix, 157; 162; 165-73; 178; 275; 281. 96.

PRESBYTERY; chancel, cancellus, and chorus Psallentium clericorum, were anciently one and the same place, being the space usually screened off where the regulars (viz., Religious orders) who were obliged to keep office assembled together, to recite or chant the "offices" at stated intervals. Apse. Arcus. The secular clergy, the Jesuits, and some others of the religious orders, were not obliged to do so, and therefore in the churches built for their use the arrangement of gates, stalls, etc., is unnecessary. As many of the conventual churches or those served by the religious orders have become parochial churches, the clergy of which, not being so numerous, have caused the presbytery to be comparatively useless, the stalls have been appropriated to the public when they were situated in advance of the old altar, which was sometimes the case, and hence a portion of the choir is used by the laity. In cathedrals the choir and sanctuary are the same place; and the presbytery (as at Lincoln and other places) is behind; there was often an altar in the presbytery, and beyond which the Lady chapel extended. Raine, *Catterick Church*, p. 9, admits that the whole space within the altar rails was called the presbytery. The east end (as sketched by Willis) of Lanfranc's church at Canterbury would be a good specimen of a choir with a presbytery beyond the transepts, and in the general plan of the present cathedral the presbytery includes, according to him, the eastern transept up to the entrance of Trinity chapel; and he says (p. 70) choir is the primary and proper sense: Conrad's work he describes as choir and presbytery, the altar standing in the latter. The presbytery at S. Alban's abbey seems to offer one of the best illustrations of this important feature in cathedral churches. Walcott, *Cleeve abbey*, in Roy. Inst. of British Architects, *Sessional Papers*, 1876, p. 109, notices the square end to the presbytery there, as at other places. Associated Societies, *Reports and Papers*, 1878, p. 132. Building News *Journal*, 1874, xxvi, 8. The *Album* of Wilars de Honecort, xiii cent., shows three plans of the east end of three churches, which portions are by him inscribed "presbyteries"; Lassus, *Album*, edit. by Willis, 4to., London, 1859.

In S. Clemente at Rome, in front of the altar, still remains the marble enclosure of the presbytery, bearing the monogram of pope John VIII, and therefore as old as ix cent. At Sessa cathedral, in Terra di Lavoro, a tolerably complete presbyterium exists; Nesbitt, in Archæologia, 1867, xl, pt. 2, p. 202-8. At S. Lorenzo at Florence the presbyterium was altered 1787 by G. M. Paoletti, to give a view of the capella de' Principi (begun 1604 by M. Nigetti), which in 1722 had cost 18,000,000 lire, and now perhaps 22 millions. 1. 2. 19, 28.

PRESCRIPTION; see Light and air. 14.

PRESENCE CHAMBER or privy or private chamber. A spacious room in large houses of the xv and xvi centuries, adjoining to or nearly connected with the Hall, generally having a bay window looking on to the quadrangle in front or rear, and used as a receiving room for the guests both before and after dinner. It was decorated with tapestry and had cushioned seats. A good exam.ple exists at Crosby hall, London. Audience chamber. 1.

PRESERVATION OF MATERIALS; see Deterioration; Atmospheric influence; Decay; Oxidation; Drying closet; Enamelling; Iron (p. 47); Galvanized iron.

As regards Iron;—Lime is a good preservative. A bricklayer when leaving off work smears his trowel with mortar. Iron cramps bedded in mortar have been found fresh 400 years after (Wren, *Parentalia*, fol., London, 1750). Large water mains, iron tanks, etc., are limewhited inside to prevent the rust affecting the water. Powdered lime is dusted into steel goods when laid by; (Smith, *On the cause and prevention of Iron rust*, in Builder *Journal*, 1864, xxii, 318.) No material could be more destructive to iron, especially wrought iron, than plaster of Paris (Smith, *Iron Floors*, at Roy. Inst. of British Architects, 1853-54, p. 40). A thick coating of clay around iron pipes (Civil Engineer, etc., *Journal*, xxiv, 122). *Iron preservatives*, in Engineer *Journal*, and Building News *Journal*, 1867, xiv, 798; *idem*, 1875, xxviii, 136.

Amongst many suggestions are Homburg's salve of lard, camphor, and black lead; and Reaumer's varnish of oil, copal, and spirits of wine; both used hot: Maltharian varnish (1853); Machabee's patent composition (Builder *Journal*, 1853, xi, 269): a mixture of oil, litharge, resin, and white lead, used hot; oil, resin, and brick dust; the iron heated and boiled in coal tar; or the surfaces smeared with cold linseed oil, which forms a varnish; Smeaton (as in Gwilt's *Encyl.*, § 2264): the iron made red hot, and linseed oil burnt upon it carefully: tar oil, asphaltum, and resin (Builder *Journal*, 1853, xi, 191); iron heated and coated with natural asphaltum or mineral bitumen in the solid state resisted a moist atmosphere for fifteen years (*idem*, 1863, xx, 373); India rubber dissolved in linseed oil, the iron heated to 350° Fahr. (New York Polytechnic Club; printed in Architects' and Mechanics' Journal, and in Dublin Builder *Journal*, 1860, June 1, p. 271); Butcher's composition, a sort of elastic varnish (Civil Engineer, etc., *Journal*, 1857, xx, 378); a varnish formed of paraffine and petroleum (Dr. C. Pusher, July 1871); a varnish of naphtha was used 1840. Iron well cleaned with acids, and then with water, and brushed over with copal or lac varnish, and a little litharge, is said never to peel off and to resist the action of water (Mining Journal, and C. E. *Journal*, 1847, x, 200). The clear surface of tin or other bright metal brushed over three to five times with a rather thin solution of good 'orange shellac' protects metal from the action of water (W. L. Scott, in Builder *Journal*, 1856, xiv, 615). Barff's process is referred to s. v. Oxidation. This late invention, together with the process of George Bower of S. Neot's, are described in The Engineer *Journal* of 12 April 1878, and 7 May 1880.

With Paint. Protoxide or metallic, and others named, s.v. Paint.

Coating metal with metal. The iron work to the Royal Exchange in 1670, "which shall be placed on the top of the cupilo, shall be cased with copper richly gilt". Tytherleigh's patent for coating iron with brass is stated not to be successful (B. *J.*, 1859, xvii, 368). Gilding ironwork is often done.

Stone. Oiling stone is noted *temp.* Henry V (1413-22), Notes and Queries *Journal*, 3rd ser., v, 68, and has been occasionally done of late years; it is not advocated in Ecclesiologist *Journal*, 1844, iii, 79. The processes of Barrett, and of Brard, are described herein, and in Building News *Journal*, 1855, i, 110, 566: of Sylvester, Barlow, Tissien (Hutchinson), Daines, and Ransome, in *idem*, ii, 904; of Kuehlmann, i, 1198 and ii, 618; of Daines, report by Barry, 1856, ii, 561; of Rochas for limestone, in Builder *Journal*, 1852, x, 28: and of Szerelmey, *idem*, 1859, xvii, 41. Fluo-silicic acid, and silicate of potash, advertised June and September 1863. Prepared silicate of soda and chloride of calcium (Ransome's). Bartlett's patent indurating solutions and siliceous paints, 1863, applied at Houses of Parliament. *On some errors relative to the application of the soluble silicates of soda or potash*, Civil Engineer, etc., *Journal*, 1861, xxiv, 37. Black oxide of manganese by Robert, of Paris. Building News *Journal*, 1869, xvii, 403. Tite, *Stone preservative processes*, at Royal Inst. of British Architects, *Sessional Papers*, 1861, and *Discussions;* and in Builder *Journal*, xix, 82, 90, 120. Ansted, *On Artificial Stones, etc.*, at British Association at Cambridge, Oct. 11, 1862; and Builder *Journal*, xx, 764-5. Badigeon. Induration. Hutchinson.

Timber, and seasoning; preservation from the weather, dry-rot, attacks of insects, and boring worms. *Detached Essay*, Heat, p. 10. Dry-rot. Eremaucasis. Hardening of Timber. Seasoning. Painting. Bedding timber. Salt. Whitewash. Tarring. Albumen. Betula. Creasote. Breaming. Worms.

The best means of preserving timber from decay is to have it thoroughly seasoned and well ventilated. The chief processes

attempting to secure the preservation of timber are the following. Those marked * are described more fully herein.

Temp. Henry VIII. "Lye to season with"; TURNER AND PARKER, *Dom. Arch.*, iii, 105.
1803. Papworth; corrosive sublimate and water.
1819. Lingard; not stated.
*1832. Kyan; bichloride of mercury and water, 1 lb. to 15 galls.
1837. Flockton; wood, tar, and acetate of iron.
1837. Lesellier; bichloride of mercury and water, and when dry, glue, size, etc.
1837. .....; silicate of soda, and then muriatic acid.
*1837. Margary; acetate, or sulphate of copper and water.
*1838. } 1840. } Burnet; chloride of zinc and water. (Now most in use.)
1838. } *1848. } Bethell; creasote, *i.e.*, oil of tar, and a crude solution of acetate of iron, commonly called pyrolignite of iron, forced into the wood at a high pressure.
*1839. Boucherie; solution of pyrolignite of iron; chloride of calcium, etc.; and to impregnate the tree with it prior to its being cut down, or immediately after it has been felled. C. E. *J.*, 1857, xx, 405: xxiv, 282.
1840. Münzing; chloride of manganese (waste liquor in manufacture of bleaching powder).
*1840. Payne; sulphate, or muriate of lime, and sulphate of iron and water; sulphate of iron and chloride of calcium; air being first exhausted from the wood. (BARIUM).
1845. Ransome; silicate of soda, to be afterwards decomposed by an acid in the fibre in the wood.
1846. Payne; carbonate of soda.
1846. Boucherie; sulphate of copper.
1849. Vernet; weak solution of arsenic alone or combined with other materials. C. E. *J.*, xii, 351.
1855. P. Le Gros; muriate or hydrochlorate of manganese, neutralised by chalk or oxide of aluminum, etc. BUILDER *Journal*, 1855, xiii, 45. (MANGANESE).
*1856. Payne; soluble sulphides of the earths (barium sulphide, etc.), to be afterwards decomposed in the wood by acids.
1857. Dembinski; silicic acid. B. *J.*, 1857, xv, 124.
1862. De Lapparent; slight carbonisation with common gas. B. *J.*, 1862, xx, 432, 789.
1863. Dorsett and Blythe; injection of heated solutions of sulphate of copper. B. *J.*, 1862, xx, 810; 1863, xxi, 323.
1869. Dr. Feuchtwanger claims thirty-six years of experiments; watching *Kyan*, bichloride of mercury; *Burnett*, chloride of zinc; *Earl*, protosulphate of iron; *Behr*, solution of borax; *Henneman*, resin; cold and hot carbolic acid; tar, with petroleum. He claims the first application of silicates to prevent teredo navalis, fire, and water; using soluble glass, *i.e.*, steams the timber, injects a solution of silicate of soda for eight hours, and soaks the stuff in lime water for eight hours; BUILDING NEWS *Journal*, 1869, xvi, 29.
1875? Gardner; dissolving the sap by chemicals in open tanks, driving out the remaining moisture; and a further injection of chemical substances adds to the durability.
1880. Beythe of France; thermo-carbolisation process; carbolic acid forced in by the action of dry steam at high pressure.

FRANKLAND, *Technological Applications of Timber, etc.*, read at Chemical Society, 5 June, 1854. BURT, *Preservation of Timber*, rewarded by the Institution of Civil Engineers, November 1853. See also the general index to the Minutes of Proceedings, i-xx, p. 333. PARRY, in Bath Agricultural Society, reprinted in NICHOLSON, *Journal*, xx, Nos. 85, 86, 87; and in REPERTORY OF ARTS, *etc.*, No. 63, is well worth attention. BUCHANAN, *Millwork*, 8vo., London, 1841, p. 349. ROYAL ENGINEERS, *Papers, etc.*, 1842, v, 281. *Jurors' Reports*, Exhibition of Industry 1851, p. 122 and 153. HOLTZAPFFEL, *Woods, etc.*, 8vo., London, 1843, p. 113; 117. *Preservation of Timber*, in BUILDING NEWS *Journal*, 1869, xvi, 224-6; 1867, xiv, 20, 59; 515, 609, 647.

GYDE, *On Causes and Prevention of Mildew—Saturation of Growing Wood, etc.*, rewarded 1848 by the gold Isis medal of the Society of Arts; CIVIL ENGINEER, ETC., *Journal*, 1850, xiii.

Sundry recipes and remarks worth noticing are given in BUILDING NEWS *Journal*, 1863, x, 417; 1869, xvi, 225; 1871 xx, 73; 1872, xxiii, 413, kiln drying; 1875, xxviii, 249; 1877, xxxiii, 144; 1879, xxxvi, 595, etc. In BUILDER *Journal*, 1849, vii, 466; 1855, xiii, 72; 1859, xvii, 83; 1860, xviii, 224, 388; 1862, xx, 775; xxi, 146; etc. 1. 14. 71.

PRESIDENT QUARRY; at Garscube, Dumbartonshire, affords a sandstone, composed of fine siliceous grains with an argillo-siliceous cement; micaceous; pale brownish grey in colour; the beds irregular. It was used at the Bank of Scotland and houses adjoining in Ingram Street, Glasgow, where its surface being porous is consequently dingy from smoke and dirt; at Baron's Court, county of Tyrone, etc. Commissioner's *Report on Stone*, 1839.

PRESS. A movable closet or cupboard, (ARK), used chiefly for storing linen and clothes. WOODWORK.

PRESS-ROOM; see PRINTING HOUSE.

PRESSURE. Of water; NEVILLE, in CIVIL ENGINEER, *etc.*, *Journal*, 1840, iii, 79; BUILDER *Journal*, 1846, iv, 26. In In restoring walls, BUILDER *Journal*, xii, 323. To roofs on walls, TATE, *Mechanics*, 113. *The New Pressure Recorder*, 1868, by Bailey and Co. of Salford. TURNBULL, *Theory of the Hydro-Mechanical Press*, 1831. Alex. JAMESON (*i. e.*, Turnbull), *Mechanics of Fluids for Practical Men.*

PREST (GODFREY) with N. Broker, coppersmiths, contracted for the tomb of king Richard II in Westminster Abbey. NEALE, *W. Abbey*, 1818-23, ii, 107; 111-2. YEVELEY.

PRESTI (BONAVENTURA), carpenter, became a Carthusian monk; rebuilt the palace of the Nunziata, and restored some public buildings, at Naples; began 1668 the wet dock of the arsenal, but not being able to keep out the water, F. Picchiatti, Pichetti, or Picchiani, of Ferrara, superseded him about 1670. 3

PRETI (FRANCESCO MARIA), born 1701, of Castel Franco, in Trivigiano, studied at Brescia, designed the church (or cathedral) of S. Liberale, and a theatre, in his town; studied at Padua, where he gave a design for the façade to S. Giustina, and made some additions and alterations to it; and designed the churches of Valla (Ionic); of Salvatronda (Doric); of Caselle (Corinthian); and of Tombolo (Corinthian), all in the neighbourhood of Castel Franco. G. Miazza studied under Preti, although his senior. He died in 1774; the *Elementi di Architettura*, 4to., Venice, 1780, was selected from among a number of manuscripts by him; it is described in MILIZIA, *Lives*, with the drawings prepared for it; and the above theatre is engraved in the publication. 3. 12.

PRETORIUM; see PRAETORIUM.

PRÉVESA and PALAIOPREVESA; see NICOPOLIS, in Epirus.

PRÉVOST (...), a member 1702 of the academy of architecture at Paris.

PRICE (JOHN), of Richmond, Surrey. Rebuilt 1714 the church of S. Mary at the walls, Colchester, Essex, at a cost of £1,154. "Built" 1712-20 Canons near Edgware, the seat of the duke of Chandos, as on a print of the south front among the King's drawings, at the British Museum; the edifice, though also attributed to J. JAMES, was designed by J. Gibbs. Another print 1720 shows "west prospect" of a very large house at Headley, Surrey; a third is inscribed "Elevation of a new house intended for the duke of Chandos in Mary-bone-fields, designed by John Price, architect 1720": the wings as existing are attributed to — Shepherd. He published *Some considerations—for building a bridge over the Thames from Fulham to Putney*" with a design, 8vo., 1726; also *a Second letter—a wooden bridge according to a draught and model*, 8vo., 1726: and with his son designed and built 23 April 1734-36, the church of S. George the martyr, Southwark, at a cost of £4260. He died November 1736 (HIST. REGISTER).

PRICE (FRANCIS), surveyor or clerk of the works at Salisbury cathedral, published *A series of particular and useful observations, etc., on Sal. cath.*, 4to., 1753; 1787; 13 plates. *The British Carpenter, or a Treatise on Carpentry*, 62 pl., 4to., 1733-35; 1753; 1759, 4th and best edit., 62 pl.; 1765. BUILDER *Journal*, 1873, xxxi, 765.

PRICKE (ROBERT), bookseller, published *The Art of Fair Building*, a translation of the French work by P. Le Muet, fol., London, 1670; 1675: *Perspective Practical*, by a person of the

Society of Jesus (J. Dubreuil), transl., 4to., 1672; 1698: *A New Treatise of Architecture according to Vitruvius*, after J. Mauclerc, 50 pl., fol., 1669; 1670; 1676; 1699: and *The Architect's Store House; frontispieces, doors, ceilings, alcoves, etc.*, fol., 1674.

PRICKER; see PIERCER.

PRICKET. The top of the steeple; a term used 1722 in Scotland.

PRICKING UP. The first coat of plastering on lath. FIRST COAT. FREIZING. PLASTERER'S WORK. In Scotland the plasterers use a roughly-fashioned scratching tool, somewhat like the wooden part of a four-toed whitening brush, with the end (where the bristles would be) cut in a zigzag form into four acute-angled points, by which means the scratching is done in a more uniform manner than with the lath. *J. W.

PRICK POST. A short post in a "post and rail" fence, between the two standards into which the rails are morticed; it is pointed and driven into the ground, and nailed to the rails, giving additional stiffness. S. J. B.

A post framed into a breastsumer between the principal posts, for the strengthening of the carcase; MOXON, *Mech. Exercises*, Carpenter, 4to., Lond., 1679; 1694, p. 167; and WREN. *Parentalia*, fol., Lond., 1750, p. 336. Also with 'crown post' formerly applied to a KING POST. A pair of prick posts were required in the middle of a bay of a barn, if the bay be 20 ft. long, its greatest length. 4.

PRIENE, now represented by Palazzo, or Samsoon, in Asia Minor, and near the river Mæander. The temple to Minerva Polias, of the Ionic order, was designed *cir.* 373-340 B.C., by Phileos or Pythius, who wrote a treatise upon it; VITRUVIUS, i, 12, and pref. vii; it was dedicated by Alexander. It had six columns in front and eleven on the flanks. A propylæum or entrance to the peribolus; parts of a theatre, of a stadium, and of a forum, are also to be seen. SOCIETY OF DILETTANTI, *Antiq. of Ionia*, fol., London, 1769, i, chap. 2, with 18 plates; the frieze therein is conjectural, states FALKENER, *Museum, etc.*, 8vo., 1851, i, 168. CHOISEUL-GOUFFIER, *Voyage Pitt.*, fol., Paris, 1782-1809, i, 115-6. DALLAWAY, *Constantinople*, 4to., London, 1797. CHANDLER, *Travels*, 1775-6, p. 200, etc. STUART, *Antiq. of Athens*, fol., 1830, iv, p. 35, note. LEAKE, *Asia Minor*, 8vo., London, 1824, p. 239, 352. FELLOWS, *Asia Minor*, p. 268. TEXIER AND PULLAN, *Principal Ruins of Asia Minor*, fol., London, 1865. PULLAN, *On Classic Art*, 4to., London, 1871; and *Cat. of photog. views*, 1876. RAMÉE, *Hist. Gén. de l'Arch.*, 12mo., Paris, 1843, i, 420. RAYET ET THOMAS, *Milet et le golfe Latmique Fouilles et Explor. arch.*, 4to., Paris, 1877. 2. 3. 25.

PRIESTS' CHAMBER. Such a room sometimes occurs in a church, as in Brigstock church, Northamptonshire, at the west end of the south aisle, where a good-sized fireplace remains. Another of the same period and in the same position occurs at Ulcombe, Kent; ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., 1876, p. 243. PORCH, *sub* parvise. Attached to the chapel in domestic buildings were usually two small chambers for the use of the priests, chaplains, or friars; these chambers are frequently mentioned in the Liberate Rolls, as noted in TURNER AND PARKER, *Dom. Arch.*, 8vo., Oxford, 1853, ii, 81. "To climb by the winding stair from the deanery into 'some small chamber' in the south-west tower still existing with traces of its ancient fireplace"; STANLEY, *Hist. Memorials of Westminster Abbey*, 4th edit., 8vo., London, 1876, p. 467.

PRIESTS' COLLEGE. The example at Cobham, Kent, attached to the church, is given by ECCLESIOLOGICAL SOCIETY, *Instrumenta Ecclesiastica*, 4to., London, 1844-47, 1 ser., pl. 12.

PRIESTS' DOOR. The entrance invariably made (originally) to the chancel of a church, and said to be for the use of the officiating priest; it is usually on the south side, towards the western end; an example on the north side occurs at Bishops Lydeard, Somersetshire (BRANDON, *Churches*, 64). A peculiarly ornamented priest's door at Hanslope church, Bucks, is in BUILDER *Journal*, 1847, v, 111; and a new one at Little Canfield church, Essex, in BUILDING NEWS *Journal*, 1859, v, 517. "The small chancel door, called the priest's door—never (originally) had a lock, but always an interior bar, showing it could only have been used from the inside; so the priest could never have entered the church by this way, unless the door were previously opened for him"; note to DURANDUS, *Symbolism*, edited by Neale and Webb, 8vo., Leeds, 1843, lxvi.

PRIETO (VENTURA). The board of works at Madrid, finding that the *maestros* were not faithfully carrying out their contract to erect the puente de Toledo, over the river Manzanares, at Madrid, appointed Prieto *maestro de obras* 2nd Oct. 1684. He was succeeded by F. Sanchez. It appears not to have been completed until 1735. 66.

PRIMARY OR PRIMITIVE COLOURS. Blue, yellow, and red are so considered in artistic work, and are so called because they are those from which all other colours are derived. When two primaries are mixed, they form secondaries; thus blue and yellow form green; red and yellow, *orange*; red and blue, *violet*. HAYTER, *The Three Primitive Colours*, a Practical Treatise; Newton's *Distribution of the Colours in the Rainbow*, 4to., 1830. FIELD, *Chromatography*, 4to., London, 1835; new edit. by SALTER, 1869.

The Primary Colours			The Secondary Colours.			The Tertiary Colours.		
Yellow with	5	}	Orange with	8	}	Russet with	21	
Red	5	}	Purple	13	}	Olive	24	
Blue	8	}	Green	11	}	Citron	19	
Yellow	3	}	Orange	8	}	Russet	21	
Red	5	}	Purple	13	}	Olive	24	
Blue	8	}	Green	11	}			
Yellow	3	}						

LEWIS, in *Sessional Papers*, Royal Inst. of Brit. Architects, 18 April 1853, records his experiments as producing,—

By Daylight.				By Gaslight.		
RED.	YELLOW.	BLUE.		RED.	YELLOW.	BLUE.
5	5			12	12	16
19	31	50				
RED.	GOLD.	BLUE.		RED.	GOLD.	BLUE.
or 15	55	30	or	9	66	25

giving the nearest approach to a neutral tint. Resulting that with ordinary positive colours at least one-half of the surface by day, and two-thirds by gas light, might be gilt without producing a gaudy effect.

The primitive colours were lately considered, scientifically, to be red, green, and blue. Prof. Clarke Maxwell's celebrated experiments showing this result, are described by BENSON, *On Science of Colour*, read at Royal Inst. of British Archts., *Sessional Papers*, 1868-69; but subsequent experiments seem to show that red, green, and violet are the three primaries; TYNDAL, *On Light*, 8vo., 1873, p. 39.

BELL, *Manual of the Science of Colour*, 8vo., 1871, describes red, green, and blue, as the primaries; and sea-green, or green and blue; pink, or blue and red; and yellow, or red and green, all in equal strength, as the secondaries.

PRIMATICCIO (FRANCESCO), born 1490 at Bologna, studied drawing under J. da Imola and Bagnacavallo, and under Giulio Pippi at Mantua, where at the palazzo del Té he executed many ornaments and figures in stucco, and painted several apartments for the duke Federigo; who recommended him 1518 to François I, king of France; he left for that country in 1531, and executed for that monarch the first stucco and the first frescoes of any merit in France. In 1540 he was sent to Rome to form a collection of antiques and casts, which taken to France were cast in bronze and placed in the queen's garden at Fontainebleau, where he completed the gallery 456 ft. long, 18 ft. wide, left unfinished by il Rosso; it was pulled down 1738 for the erection of apartments for some courtiers. He was appointed one of the king's chamberlains, and in 1544 abbot of S. Martin at Troyes, with a revenue of 8000 crowns. He

executed the colossal fountain projected by Cellini; the ball-room, which was carried out by Niccolo Abate of Modena from Primaticcio's designs; also a hall; and a lower gallery over the pond, all at Fontainebleau. BAROZZI.

He also designed 1545 or 1555 the château d'Ancy le Franc, dep. de Yonne, for comte Antoine de Clermont (ROUYER ET DARCEL, *L'Art Arch. en France*, 4to., Paris, 1863-66, i, 41, with 5 plates); in 1688 it became the property of the minister Louvois, and is still well kept up. In 1552 or 1556 a vast palace at Meudon, called the Grotto, for the cardinal de Lorraine, which is also said to be by de l'Orme; it was destroyed for the erection of a fort. DALY, *Revue Générale*, 1859, xvii, 244, states he is presumed to have projected the sustaining wall to the terrace; and notices his frescoes at Fontainebleau, viii, 140; stay in France, ix, 92; and sculptures at Blois, xiv, 216. The tomb of François I and queen Claude at S. Denis, are attributed to Primaticcio, but is by P. de l'Orme (1552-58).

Primaticcio was retained by kings Henry II and François II, who appointed him 12 July 1559 commissioner general of all the public buildings in France except the Louvre. He worked 1559, at the hôtel dieu de S. Jacques du Hault pas, superseding de l'Orme: 1559 at the château de Madrid; and was commissioned to design 1560 for Catherine de Medici, the tomb of the Valois (of Henri II and herself), on the north side of the church at S. Denis, which he began and continued until his death 1570 at Paris, aged 80 years. This tomb is often stated to be by de l'Orme; it was continued by Bullant until 1578, by de Cerceau until 1585, but never completed; the sculptures are by G. Pilon; part was removed 1621 for safety, and 1719 all was pulled down on a pretended dilapidation. The château de Chambord, usually attributed to Primaticcio, is by P. Nepveu. The hôtel d'Assezat at Toulouse is attributed to him in *Toulouse; Guide des Etrangers*, 12mo., Toul., 1844, p. 52. MANTOVA. PIPPI (G.) ORME (P. DE L'). 3. 5. 14. 20. 28. 47.

VASARI, *Lives*, edit. 1851-2, iii, 322; v, 147, 150, 206, 370-6. CADIOLI, *Descr. delle pit. e scult. di Mantova*, 1763. BOTTARI, *Descr. storica pal. del Tè*, Mant., 1783; 8vo., Mant., 1811. CAIMA, *Lettore d'un vago Italiano*, iv. *Trésors des Merveilles de la maison royal de Font.*, Paris, 1642. WAAGEN, *Kunstwerke, etc., in Frankreich*. KUNSTBLATT for 1836. BALTARD, *Paris et ses Monumens*, fol, Paris, 1803, etc. AICARD, *Patria*, 8vo., Paris, 1847, p. 2169. VERGNAUD ROMAGNESI, *Archéologie*, 8vo., Orleans, 1836, p. 42. BERTY, *Les Grands Architectes*, 8vo., Paris, 1860. CALLET, *Notice Hist.*, etc., 8vo., Paris, 1843, 2nd edit., gives a plate of Meudon grotto. GRUNER, *Fresco Decorations*, fol., Lond., 1854, text p. 33. BRICE, *Descr. de Paris*, 12mo., Paris, 1725, iii, 325; iv, 364.

PRIMATT (STEPHEN), published *The City and Country Purchaser*, 8vo., London, 1667, being probably the earliest English work on valuation, measurement, and prices of work. It was republished 1680 by W. Leybourn.

PRIME OR PRIMING COLOUR. The first (unless otherwise stated) colouring of house painter's work, forming the ground for succeeding coats. To wood work, Spanish brown was used formerly; and two or three coats are stated as necessary in John SMITH, *Painting in Oyl*, 12mo., London, 1676. KNOTTING is a previous operation. To metal work, LITHARGE, or "lead colour" is usually the primary coat. OXIDATION.

A "priming ground" is applied to a canvas prepared for an artist, on which he proceeds to depict his subject.

PRIME COST. The nett amount actually paid or chargeable for an article, after all allowances in price, quantity, or measurements, and discounts off invoice have been deducted, and without addition being made for carriage, risk, fixing, commission, or profit. Where items or articles are described in a specification as to be provided at a given price prime cost, the builder must, in making his estimate, provide for the cost of carriage, with fixing, commission, profit, and all other incidental charges, over and beyond the nett cost of the item arrived at as above: the employer being entitled to be furnished with satisfactory evidence of such nett cost; or should he himself purchase the articles, to deduct the amount, together with such of the incidental charges as the builder may not have incurred or earned.

The prime cost of a building to the contractor is the nett expenditure on the work together with the proportion of establishment charges due thereto. PROFIT. A. C.

PRINCE OF WALES'S FEATHERS; see PLUME.

PRINCE RUPERT'S METAL; see BRASS.

PRINCE'S METAL. An alloy of copper, in imitation of silver; the proportion of zinc is greater than in brass. 13.

PRINCE'S WOOD; see CORDIA.

PRINCIPAL AND AGENT, by PALEY, 8vo., London, 1833.

PRINCIPAL, or principal truss of a roof. FIRMS. TRUSS.

PRINCIPAL of stone in a roof. An example exists at the south transept of Minchin Hampton church, Gloucestershire (cut in BUILDER *Journal*, 1858, xvi, 75); and on a smaller scale at Willingham, Cambridgeshire. The nave roof at Bastia, near Assisi; probably the octagon church of S. Angelo at Perugia; and S. Zenone at Verona; all described in WEBB, *Cont. Eccles.*, 8vo., 1848, p. 455; 451; 252; with others noted s. v. GABLET herein; and by STREET, *Gothic Arch. in Spain*, 8vo., London, 1865, s. v. Roof. A stone principal, not requiring a counterfort, consisting in the connection of a trefoiled arch within a lancet arch, as carried out 1853 by J. Derick at Carlow, is shown in BUILDER *Journal*, 1854, xi, 34. 1.

PRINCIPAL BRACE; auxiliary rafter, cushion rafter, or discharging strut. The timber parallel to, and immediately under the principal rafter, assisting to support the timbers of a roof of large span, as a QUEEN POST roof; S. Paul's church, Covent Garden, is an example. 1.

PRINCIPAL POINT. In perspective; the same as the point of sight, or point of the eye. 1.

PRINCIPAL POST. The corner post of a carcass of a timber building. PRICK POST.

PRINCIPAL RAFTER; called 'back' in Lancashire. The large rafter framed with the other timbers to form a truss; it also carries the purlins. The constant 0·96 for fir in Tredgold and many other writers is an error for ·096; BUILDING NEWS *Journal*, 1875, xxviii, 447, 477, 532-588, 619. CUSHION RAFTER. 1.

PRINCIPAL RAY. In perspective; the line passing from the eye to the principal point on the perspective plane. 1.

PRINTING HOUSE, OFFICE, ROOM, PRESS ROOM. Places in which the processes of composing, and printing letter-press by hand takes place; when by steam power, the term 'machine room' is used. The press room at Oxford, 200 ft. by 28 ft., is considered the longest in the kingdom. BUILDER *Journal*, 1875, xxxiii, (Cassell's) 751. BUILDING NEWS *Journal*, 1869, (diseases) xvii, 244; 1875, (Cassell's) xxviii, 310. 5. 6. 7. 14.

PRIOLI (JUAN BAUTISTA), a Genoese, succeeded 1586 to el maestro Domingo, of Genoa, as *maestro mayor* in the erection of the vast palacio del Viso, at Sta. Cruz, in la Mancha, for the first marquis of Sta. Cruz. 66.

PRIOR'S DOOR. Fine examples of the entrance to the church for this dignity, occur at Norwich (KING, *Eastern Cath.*, p. 135); and at Ely (p. 223).

PRIOR'S LODGE or lodging: see ABBOT'S LODGING. At Clermont, the prior's lodge was placed on the east of the church. At Canterbury, on the plan made *cir.* 1130-74, on the east side of the herbary court, which was eastward of the church; it probably depended on the circumstances of each case, as did the abbot's lodging; WALCOTT, *Church, etc., Arrangement*, in Royal Inst. of British Architects, *Sessional Papers*, 1860-61, p. 65; in BUILDER *Journal*, 1860, xviii, 814; and published separately, 8vo., London, 1861. At Castle Acre priory, the lodge was on the west side of the cloister; BRITTON, *Arch. Antiq.*, 1812, iii.

PRIORY. A monastery of lesser rank than, and dependant upon an ABBEY, and presided over by a prior; or if a nunnery by a prioress. A list of those in England is given in GODWIN, *English Arch. Handbook*, 8vo., 1867; and in WEALE, *Dict. of Terms*,

8vo., London, 1849-50, s. v.; and another list, s. v. Alien priory, which was a cell or religious house dependent upon the chief monastery in a foreign land. The Cluniac cells, of which there were 42 or 45 in England, were all priories, or obedientiæ.

The BATALHA in Portugal exhibits, by its woodcut s. v., a fine example of such an institution. HUNTER, *Priory of Coldingham*, 9 pl., 4to., 1858. CALEY, *Survey of Priory of Bridlington*, in ARCHÆOLOGIA, xix, 270. VIOLLET LE DUC, *Dict.*, 276; 284. BURTON, *Mon. Ebor.*, fol., York, 1758, p. 63. KING, *Munimenta Antiq.*, fol., 1799-1805, iv, pl. 30. SURTEES SOCIETY, *Finchale Priory*, 8vo., Newcastle, 1837; and *Coldingham Priory*, 8vo., London, 1841. VENABLES, *Alien Priory of Ruvendale*, in ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., London, 1878, p. 168-70. DALY, *Revue Générale*, 4to., Paris, 1851, ix, 311-6; 336; 370; 375; 437. BUILDING NEWS *Journal*, 1870, xviii; xix; xxvii; xxviii; and xxxi; gives descriptions of priories. 1. 2. 14. 19.

The prior's seat in the church was on the north side of the choir next the screen; the abbot's was on the south side.

PRISMATIC LIGHTS for pavements; see PAVEMENT.

PRISMATORY. In the contract dated 1411 for building Catterick Church, Yorkshire, this word denotes the three sedilia; it is supposed to be an error for "PRESBYTERY". 17. 19.

PRISON. A building specially constructed for the confinement of prisoners of war, criminals, or debtors. GAOL. PENITENTIARY. Various statutes, such as 23 Henry VIII, c. 2; 28 Henry VIII, c. 9; 5 Elizabeth, c. 24, § 4; 1 Mary, c. 14; refer to early structures. J. Howard in 1777 was the first to draw attention to the miserable condition of the existing buildings, and to suggest their amelioration. His plan was adopted at Cardiff, Caermarthen, and other places. In 1782 William Blackburn obtained the premium offered by the Commissioners for Penitentiary houses for the best plan for such establishments. Many county gaols and other structures of the same nature were consequently built under his inspection. He was followed by R. F. Brettingham, who erected the prisons at Reading, Hertford, Poole, Downpatrick, and Northampton. In 1821 occurred the competition for the penitentiary at Millbank.

In 1816 J. Haviland erected at PITTSBURGH, the penitentiary, the first designed on the radiating principle, PANOPTICON PRINCIPLE. The Eastern penitentiary at Cherry-Hill, Philadelphia, also by him, is now the standard for all edifices for such purposes. That at AUBURN, New York state, was also a model prison. 50.

1589. Venice; *publiche prigione*; by A. da Ponte, for 500.
1772. Ghent (model); GRANVILLE, *S. Petersburg*, 1835, i, 27. WEALE, *Handbook*, 202; DURAND, *Parallele*, No. 28.
1808. Dartmoor; by D. A. Alexander. Following books, and ACKERMANN, *Repository of Arts*, 1810, p. 163.
1816. London; Middlesex House of Detention; new plan, BUILDER *Journal*, 1846, iv, 283.
1834-40. Palermo; by Di Martino, for 1800.
1840-2. Pentonville; see books following; and WEALE, *Handbook to London*, 1851. CRESY, *Encyc. of Civil Engineering*. BUILDER *Journal*, 1847, v, 483.
1842. Reading; Scott and Moffatt, I. L. N., 1842, iv, 108.
1848. Devonport (borough); by J. P. St. Aubyn, B. *J.*, 1849, vii, 393.
1850. Liege; by — Dumont.
1855. Southampton; by — Critchlow. B. *J.*, xiii, 285.
1867. S. Alban's; by Martin and Chamberlain, of Birmingham, B. *J.*, 1867, 833.
1868. For parts of Lindsey, Lincolnshire; by F. Peck, B. N. *J.*, 1869, xvi, 304.
Gosport; military, *Aide Mémoire*, iii, 140.
Spilsby gaol, Lincolnshire; by H. E. Kendall.
Dorchester; 4 blocks, each joined by iron bridges. *Letters* on Agriculture of the Bath Society, viii, 329.
Paris; *Zellengefangniss* auf dem Boulevard S. Mazas, or house of detention, by Gilbert and Lecointe. ALLGEMEINE BAUZEITUNG, 1852, pl. 510 9.

Many gaols are now (1879-80) being discontinued and so pulled down; as Bath, Beverley, Dolgelly, Falkingham, Mold, Montgomery, Northampton, Norwich city, Ripon, Southampton, Wisbech. 1. 3. 6. 14. 25.

The Roman *carcer* was a public open prison; *ergastulum*, and *carcer rusticus*, private slave punishing place; *area*, public torture place, "cell of oak in which criminals and slaves were confined"; *puteus*, punishment of thieves (or slaves, WHITE and RIDDLE, *Dict.*, 1876). Of the renowned Mamertine prison at Rome, of the time of its kings, its principal chambers were lately discovered or identified, now being used as cellars of houses; PARKER, *Walls, etc., of Rome*, 8vo., 1874; and BUILDER *Journal*, 1875, xxxiii, 593. 28. 78.

The lowest story of a donjon or keep of a castle was commonly used as a prison, cell, or dungeon; OUBLIETTE, and DUNGEON. VIOLLET-LE-DUC, *Dict.*, s. v. Prison.

HOWARD, *State of the Prisons in England and Wales*, etc., 4to., London, 1777. *Report of the Committee* appointed by the corp. of the City of London, to examine all the prisons in the kingdom previous to the building of Newgate. ELMES, *Hints for the Improvements of P.*, 4to., London, 1817. EDINBURGH REVIEW, 1821, No. 70, notices HOLFORD, *Thoughts on the Criminal Prisons of this Country*, 1821; GURNEY, *On P.*, 1819; and *Report of the Society* for bettering the condition of P., 1820. APPERT, *Rapport, etc., des P., etc., en France*, 12mo., 1824. BALTARD, *Architectonographie des P.*, etc., 36 pl., of London, Naples, Rome, Lyon, the Bastille, Paris, etc., fol., Paris, 1829. HOLFORD, *The Penitentiary at Millbank*; *App. on the construction of P.*, 8vo., 1828. *Reports of the Poor Law Commissioners*, 4 vols., fol., London, 1835. RASPAIL, *Les P. de Paris*, 8vo., 1839. *Third Report* of the Inspectors of P. for the Home District, 8vo., 1838: the 14th was in 1849. *Official Report*, giving details of *Prison cells*, etc., for County Police stations. JEBB, *Modern P.; their construction and ventilation*, 10 pl., 4to., 1844. *Report* of the Surveyor-General of P.; *Const., Ventil., and details of Pentonville prison*, pl., 8vo., 1844: *Second Report*, 40 pl. of *cells*; Birmingham, Leeds, Winchester, etc., 8vo., 1847. FIELD, *Reading County Gaol; the advantages of the separate system*, 8vo., 1848. ALHOY ET LURINE, *Les P. de Paris*, 8vo., Paris, 1846. JEBB, *Report on the Const. and Discipline of Convict P.*, 8 pl. Dartmoor P., 8vo., 1851. CATEL, *Le P. de Dartmoor*, etc., 1809-14, 2 vols., 8vo., 1847. DIXON, *London P.; descr. of the chief Provincial P.*, 12mo., London, 1849-50. PEARSON, *What is to be done with our Criminals?* 8vo., 1857. *Competition for prisons* at Genoa and Turin, BUILDING NEWS *Journal*, 1857, iii, 1024. CRÉMIEUX, *Du Système Penitentiaire Agricole et Professionel, pour les prisonniers adultes, avec projet de* 400 *cellules*, 4to., Paris, 1864; and *Le Système Pénal et les Prisons Penitentiaires de l'Angleterre en* 1867, 4to., 1868.

DURAND, *Recueil et Parallèle des Edifices, etc.*, fol., Paris, 1800; texte, 1842. *Papers* of the Corps of Royal Engineers, 4to., 1844, etc., vii. GOURLIER, BIET, etc., *Choix d'Edifices Publics*, 3 vols., fol., Paris, 1825-50. DALY, *Revue Générale*; MONITEUR DES ARCHITECTES; and ENCYCLOPÉDIE D'ARCHITECTURE. WEALE, *Handbook to London*, London prisons, 12mo., 1851, p. 753-68: and Newgate, in BRITTON AND PUGIN, *Public Buildings*, 8vo., 1824.

PRISON OF A MONASTERY. The tribunal and prison usually adjoined the great gate, as at S. Stephen's at Caen; or occupied the chamber above it, as at S. Alban's, Tewkesbury, Westminster, Malling, Hexham, and other abbeys. The DUNGEON is under a tower at S. Gabriel (Calvados); near the transepts at Berne; on the south of the chapter house at Durham; while at Clugny it had no stair, door, or window: at S. Martin des Champs it was subterranean; and at Hirchau it barely permitted the prisoner to lie down. LANTERN, or underground cell, etc. CELL. LYNGHOUSE or lyingehouse. In Lambeth palace are the noted Lollards' tower and prison cells.

By the constitutions of different synods, bishops were directed to provide prisons for the confinement of such of the clergy as deserved punishment. In the reign of Edward III the abbots at Northampton decreed that in every monastery there should be a prison in which great delinquents should be punished. DECANIUM. KING, *Mun. Ant.*, iv, 128; 154, mentions cells within the walls and pillars of cathedrals and churches; as at S. Alban's, Gloucester, Canterbury, Leicester, Ewenny, Glaston-

bury, Dantzic in Germany, etc. These were but just large enough for the person to stand up or lie down; and had no other light or air than was admitted through a small loop hole, which at the same time afforded a view of the altar. In the Temple church is such a cell; (PENITENTIAL CELL or Penance chamber); and in the north aisle of the choir at Worcester is a bay window supposed to have been connected with a monk's cell.

DUGDALE, *Monasticon*, 118; 383. FOSBROKE, *Brit. Mon.*, ch. xlv. DE CAUMONT, *Abec.*, 115. LENOIR, *Arch. Mon.*, ii, 430. DUCANGE, ii, 173, 752. FOSBROKE, *Glouc.*, 1819, ii, 129c. TAYLOR, *Index Monas.*, vi, and two cuts. WHITAKER, *Whalley*, 1818, p. 112. 19.

PRISON CHAPEL. It should be so disposed as that each prisoner should join in the exercise of worship, seeing and hearing the minister, without being himself seen; regard being had at the same time to the fundamental principle of the separation of prisoners amongst themselves. A section, with the singular plan, of the chapel to the new Surrey county prison, having 394 separate seats, is given in BUILDER *Journal*, 1850, viii, 195. The seating is given *idem*, 1847, v, 483.

PRITCHARD (THOMAS FARNOLLS), of Eyton Turret, Shropshire, designed 1773 the first cast iron bridge in England, constructed by Abraham Darby of Coalbrook Dale, and erected 1777-79 over the river Severn near Broseley. The span is 100 ft., and the arch nearly semi-circular. He died in Oct. 1777; many of his designs came into the possession of John White of Devonshire Place, one of his grandsons. TREDGOLD, *Strength of Cast Iron*, 8vo., 1842, 4th edit., p. 10.

PRITCHETT (James P...), born Oct. 14, 1788, at S. Peter's near Pembroke, was a pupil of — Medland of Southwark, and for two years in the office of D. A. Alexander. He commenced practice 1812 in London, and 1813 joined at York with — Watson, the successor to J. Carr; where they designed the deanery, S. Peter's school now the school of art, the savings' bank, the new front to the assembly rooms by lord Burlington, lady Henley's hospital, Lendal and Salem chapels; at Wakefield, *The Pauper Lunatic Asylum*—one of the largest at that time, and which they published, fol., London, 1819: at Beverley, the court house and gaol; with numerous churches, etc.; 1838, S. James, Meltham Mills, near Huddersfield (C.E., ii, 28); 1859, S. Nicholas church and schools at Durham (B. N. *J.*, v, 402-5): and as architect and surveyor for upwards of 50 years to the earls Fitzwilliam at Wentworth, for three generations, enlarging, etc., the mansion, erecting churches, parsonages, schools, and lodges on the estate. "Among his pupils were S. W. Daukes; — Blackett of Furnival's Inn; — Medland of Gloucester; — Middleton of Cheltenham; — Gilbert of Nottingham; and his sons, of Walton-under-Edge, and Darlington. He died at York, 23 May 1868, aged 80 years;" BUILDER *Journal*, xxvi, 406.

PRIVATE CHAPEL. A chapel such as two or more families, residing at a considerable distance from the parish church, might support without relief from contributions to the parish church; being first consecrated by the bishop, and having a chaplain, provided by those to whom it should belong. It was not a domestic oratory, or a domestic chapel; MANNING, *Hist. of Surrey*, fol., 1804, i, 448, who notices Kew chapel as having been so commenced in 1522; and rebuilt 1714 as chapel of ease to Kingston. Private chapels also belong to bishops, abbots, colleges, halls, and hospitals or asylums. DOMESTIC CHAPEL. PHILLIMORE'S edition of BURN, *Eccles. Law*, 8vo., London, 1842, s. v. Curate, etc. JACOB, *Law Dict.*, s. v. Chapel.

PRIVATE DWELLING HOUSE. This subject formed a 'group' in the Universal Exhibition at Vienna, 1873; as referred to in BUILDING NEWS *Journal*, 1872, xxiii, 255. HOUSE.

PRIVERNUM; see PIPERNO.

PRIVET. Shrubs or low trees, natives of Europe and Asia. Ligustrum vulgare, Common privet; grows in hedges either for shelter or for ornament, and in thickets, in Great Britain; it is a native of the south west of England. It was formerly called Prim or Primwort from its being used for verdant sculptures or TOPIARY WORK, and for primly cut hedges, as may be seen in the plates to works on *Gardening* of the last century. It is one of the few plants that will grow in the smoke of London; and thrive under the drippings of other trees. The berries are dark purple, almost black. 14.

PRIVY. (Fr. *cabinet d'aisance; latrine; commodité*, hence *commode* for bedroom arrangements; Engl. *convenience*. Late Lat. *bacia* (80); *latrina*. Angl. Saxon, *gonge*; Anglo-Norm. and Fr., *garderobe, wardrobe*.) "Lat. *ypodromum*; Sax., *gold-hordhus vel spondoromum, digle gang-ern*: and *gold finder, gold farmer*, terms in XVI and XVII cent. for a cleaner out of privies;" WRIGHT, *Vocab.*, 8vo., 1857, p. 57, 179, and index. DRAUGHT HOUSE. JAQUES. MIDDEN. LATRINA (ANDRONA). GARDEROBE. Dr. Mead, *Dissertation on Privies* and other forms of necessaries, in Brit. Mus., Add. MS. 6270, notices that James Harrington, author of *Oceana*, 1656, was the introducer of privies with cesspools from France. "The houses at Marseilles have (1841) no latrines. Waggons go round the streets every morning, and after having received contributions from each house, the contents are discharged into the harbour, where the tide of the Mediterranean being almost nothing, it follows that in the seasons when the wind blows inland, the harbour is filled up with fæcal matters, and becomes a veritable hotbed of infection. In Sweden the houses have, on the upper floor, a projecting closet, the fæcal matter falling on to the ground"; DALY, *Revue Générale*, 1841, ii, 404. The parish books of S. Stephen, Coleman Street, in the city of London, show that between 1486 and 1507 there was a common privy in the parish, which cost it for cleansing during the year the sum of 3s.; CITY PRESS *Newspaper*, April 14, 1880. CESSPOOL. FOSSE D'AISANCE. 5. 25.

A *latrina* was placed in a small chamber on the left hand near the entrance to the baths at Pompeii. Besides the examples quoted s. v. NECESSARIUM; are Lambeth Palace, in CARTER, *Ancient Arch.*, fol., London, 1795-1807, pl. 43: Dartington hall, Devonshire, a range of XIV cent.; TURNER AND PARKER, *Dom. Arch.*, 1853, iii, 353: and others earlier in ii, 113-5: Quin abbey, Ireland, 1433, R.I.B.A., *Sessional papers*, 1862-63, p. 205, with plan: LENOIR, *Arch. Monastique*, 4to., Paris, 1852-56, ii, 365. SOCIETY OF ARTS, *Journals* for 1878 and 1879, on Sewage, etc. PUBLIC HEALTH ACT, 1875.

The modern form of privy with its cesspool is shown, well arranged for sanitary purposes, in BUILDER *Journal*, 1844, ii, 607. *Remarks on joint privies, etc.*, in BUILDING NEWS *Journal*, 1858, iv, 880. Many systems have been introduced of late years for access to the pit or CESSPOOL, for using the contents as manure, or for receiving the fæcal matter in pails to be removed periodically; in many country places the privy has been superseded by the "earth closet". Moule's patent earth closet is described in BUILDER *Journal*, 1862, xx, 731, 794; 1866, xxiv, 239; BUILDING NEWS *Journal*, 1867, xiv, 247, describes an ash closet; and 1869, xvi, 41-2 illustrates Morrell's patent ash closet. Gibson's patent earth closet and commode; the Cinder shifting ash closet of the Sanitary and Economic manure company, Salford, are among the later inventions of this sort.

PRIVY CHAMBER; see PRESENCE CHAMBER.

PRIZE; see ACADEMY; and GRAND PRIX.

PROAULION. The Gr. term used synonymously with *prodomos*, by JULIUS POLLUX, *Onomasticon*, I, cap. 8, sec. 76, 77, for the Gr. DIATHYRUM (*θυρωρεῖον* or *θυρών* or *πυλών*), and Rom. PROTHYRUM, for the passage or vestibule between the entrance door of a house and the interior *atrium*. PROTHURON. 2. 6. 78.

PROBATE REGISTRY OFFICE. A building requiring an entrance vestibule, a lofty clerks' office with a strong vaulted muniment room opening out of it; a waiting room, etc.; and a private room for the registrar. A residence which should have a distinct entrance is sometimes added for the chief clerk. A view of that at Llandaff is given in BUILDING NEWS *Journal*, 1867, xiv, 6.

PROBOLINGO, or Poerbolingo, in Java. Some miles east

of it is Jabang or Jabon, a two story temple of brick, given in RAFFLES, *Hist. of Java*, 4to., London, 1817, ii, 51 and 63.

PROCACCINI (ANDREA); born 1671 at Rome, studied painting under C. Maratti. He went to Madrid, where he arrived about 1718 or 1720, and for king Philip V had a considerable share in the plans and works of the collegiate church of S. Ildefonso (especially after the death of Ardemans in 1726), where Andrea died in 1734. He was principally occupied in advising on matters of architecture and landscape gardening; he also engraved many plates, and designed tapestry for pope Clement XI. 65. 66.

PROCACCIO (ANGELO); designed the palazzo Contarini a S. Vito on the canal grande, at Venice; CARLEVARI, *Le Fabriche — di Venetia*, fol., Ven. 1703; CICOGNARA, *Fabbriche di Venezia*, fol., Venice, 1838-40, i, pl. 122-7, dates it 1504-46, assigning it to one of the latest Lombardi

PROCESSIONAL PATH. In monastic establishments; a line of paving for the marshalling of, being the proper situations for, the officiators in the daily procession of the clergy to represent the pilgrimage of man. There were three stations in solemn processions; 1, juxta dormitorium; 2, juxta refectorium; and 3, in claustro collationis juxta ecclesiam; WALCOTT, *Old Cleeve abbey, Somersetshire*, in Royal Inst. of Brit. Architects, *Sessional Papers*, 1875-6, p. 108; 121. The path at Fountains abbey, Yorkshire, was marked out by fifty-two stones, each about 2 ft. 3 ins. square, with a circle cut in it, placed along the nave, and ranged in two lines 7 ft. from the bases of the pillars; the pathway between them was 12 ft. 8 in. wide; the cross bearer's stone is in the middle at the east end, 90 ft. from the abbot's standing place, which was in the middle at the west end, a few feet from the west door; *Recent Discoveries*, read at Royal Institute of British Architects, *Sessional Papers*, 1853-4, p. 132. Similar stones were found at Lincoln cathedral; GOUGH, CAMDEN, *Britannia*, ii, 256, pl. 8: and the circles were formerly seen at York cathedral; DRAKE, *Eboracum*, 1736, p. 519; FOSBROKE, *Encyc.*, i, 125: and at Canterbury. A line of demarcation to women was drawn across it at Durham. In the south wall of the aile nave were processional doors into the east and west walks of the cloister, where there was no GALILEE, at which ended the procession. PORCH; PARVISE. At S. Mary, Sandbach, Cheshire, and at S. Mary's at Warwick, the lower parts of the towers present three lofty archways to the west, north, and south; most probably for processional arrangement. The four sides are open in the detached first Pointed tower of S. Mary, West Walton, Norfolk, which is exactly opposite the south porch. At the third Pointed church of S. Mary, Dedham, Essex, the north and south sides only are open.

Several "church processions" are noticed in WEBB, *Continental Ecclesiology*, 8vo., London, 1848, index.

"The procession path round the cell—called pradakshina—as that round the apse, remained for some centuries as a common but not a universal feature", as in the temple at Aiwulli, *cir.* 650-680, A.D., the oldest structural temple known to exist in western India; and at Pittadkul, of about two centuries later; shewn in plans in FERGUSSON, *Indian, etc., Architecture*, 8vo., London, 1876, p. 219; 221. POLLANARRUA.

The procession path of the Chinese tombs is described in SIMPSON, *Meeting the Sun*, 8vo., London, 1874. Those in Egypt round the temples, in MARIETTE, *Monuments of Upper Egypt*, 8vo., London, 1877. 28.

PROCŒTON. The Roman name for the antechamber, where there was room, adjoining the bedchamber; as in PLINY. The houses of the Greeks had a passage called *prostas* between the antechamber (anti-thalamos) and the chamber (thalamos). Examples occur in the House of Pansa, and the Villa of Diomedes, at Pompeii. PROSTAS. 2.

PROCONNESUS ISLAND. The modern MARMORA or Marmara. It possessed celebrated quarries of white marble. In the house of Crœsus, which the Sardians call Gerusia—as also in the house of Mausolus—though all the ornaments were of this marble, the walls were of brick. It was one of the three marbles of which the temple at Ephesus was to be built; VITRUVIUS, ii, 8; x, 7: STRABO, 1, xiii, p. 588. It furnished the material for the stately edifices of Cyzicus; and was used at Byzantium by Constantine. MARMORA.

PROCURATOR. An officer of a monastic establishment At Durham he was more frequently called the cellarer; SURTEES SOCIETY, *Reginaldi Monachi*, 8vo., 1835, ch. cvi. His duties are probably defined in the following quotation:—Act anent the repair of the bridge of Balgowney; 4th Sept. 1443, "per commune consilium concessa domino Willelmo Ettale capellano et procuratori pontis de Pulgoveny ad reparacionem eiusdem libertas gilde huius burgi cuicunque honeste et sufficienti persone per eundem dominum Willelmum adducende libere sine solutione cuiuscunque pecunie preter illam summam quam soluet ad reparacionem dicti pontis, etc.;" SPALDING CLUB, *Aberdeen Burgh Records*, 4to., Aberd., 1844, i, p. 10. The procuratores of S. Mark's at Venice appear to have been paymasters of the works; RUSKIN, *Stones of Venice*, 8vo., London, 1851-53, ii, 294. 96.

PROD. A nail; see LATTBRODD, 1451.

PRODOMOS. The Greek term for the open vestibule or portico at the entrance to the cella of a temple; it is usually called PRONAOS. The Latin equivalent was ANTICUM.

PROFESSION of Architect. VITRUVIUS. NOBLE, *Professional Practice*, 8vo., London, 1836. DALY, *Revue Générale*, 1863, xxi, 286; xxviii, 1. ROGERS, *Architect's Guide*, 8vo., London, 1880, article by R. W. BILLINGS. WIGHTWICK, *Hints to Young Architects*, 8vo., 1846; 2nd edit., 1860: and his *Autobiography. The Profession of "Architect"*, in BRITISH QUARTERLY REVIEW for April 1880; and BUILDER *Journal*, 1880, xxxviii, 718. PRACTICE.

PROFILE. The outline of a building; or of any of its members, as of a cornice. It is a species of elevation or section. "Profiling" is giving to an outline the appropriate heights, projections, and curves, due to each member in each style of architecture; from which there result harmony and beauty. CHAMBERS, *Civil Architecture*, fol., London, 1759; chap. "Profiles". *On Profiles*, by M. DANJOY, in DALY, *Revue Générale*, 1853, xi, 54. CYMAGRAPH.

MOXON, *Mech. Exercises*, 4to., London, 1693, Carpentry, Gloss., p. 166, has, "profile, the same with groundplot". 1. 6. 25.

It has also been defined;—"the same with a prospect of a place or building viewed sideways and expressed according to the rules of perspective. Also, but I think improperly, it is taken for the contour or outline of any member in architecture, as that of a cornice". 4.

PROFIT. The manufacturer's addition to cost price on materials and labour, to repay him for interest on capital, rent, expenses, and remuneration. The retailer's addition to trade price to repay him in like manner. Actual nett profit is the balance of gain remaining after all costs, charges, and expenses, have been paid or allowed for. LANGLEY, *Bricklayer's Work*, 8vo., London, 1747; 1750.

PROJECTING BUTTS; see BUTT HINGES.

PROJECTION. The representation of any object in perspective; such as it would appear if viewed from a predetermined point. When the projection is made by drawing straight lines from a point it is called a perspective representation; but if formed by parallel lines it is called an orthographical representation. NICHOLSON, *On Projection*, in LOUDON, *Arch. Mag.*, 8vo., 1835, ii, 477-81. The French science of *Coupe des pierres* is projection. WORKING DRAWING. 1. 14. 25.

PROJECTION. A something beyond the general line of the front of a building, or beyond the general line of the houses in a street. This is legislated for in the Metropolitan Buildings Act 1855, but without sufficient distinctness: and in the Metropolis Local Management Act, 1862, sect. 75.

PROJECTURE (It. *sporti*; Fr. *saillé*, the English "sailing over"). The prominence given to mouldings and other members of an edifice before the naked or general face of a wall. Balconies are projectures. The word "rellish" is given as

having the same meaning, in MOXON, *Mech. Exercises*, 4to., London, 1693, p. 167.

PROJET. The French term used by English writers for the drawing which shews the general idea of the design for a proposed edifice or work of art. 25.

PROME, PEE, or PRI. A town in the Burmese dominions, on the river Irrawaddy, about 1½ miles in circumference, surrounded by a brick wall, beyond which are extensive suburbs. On the south are several steep hills covered with temples. It was the early religious capital of Birma, *cir.* 433 B.C., until 107 A.D.; No description could be given of the temples by FERGUSSON, *Indian, etc., Arch.*, 8vo., London, 1876, p. 613. SYMES, *Embassy to Ava*, 12mo., Edinb., 1827, i, 277. CRAWFURD, *Embassy to Ava*, ii, 277. Prome, and a pagoda to Gautama, 80 ft. high, are described in STANDARD *Newspaper*, 2 June 1879. A view in ILLUSTRATED LONDON NEWS, 1853, xxiii, 509: and BLACKIE, *Gazetteer*. 50.

PROMENADE or PUBLIC WALK: as the boulevards at Paris. DALY, *Revue Générale*, 1862, xxi, 128; 173; 249. Just outside many of the foreign towns are fine public promenades, planted with rows of good-sized trees; these are conducive to the beauty of the place, to health and pleasure. Besides the parks in London, the Thames embankment may now be referred to. 25.

PRONAOS, sometimes called PRODOMOS. The Gr. term of which ANTICUM or antica is the Latin equivalent. That part of a temple at the entrance to the cella. The similar part in the rear was called POSTICUM. PASTAS. PORTICO. PROSTASIS. The omission of the posticum, as in some temples, allowed the architect, without diminishing the length of the naos, to considerably augment the depth of the pronaos and of the portico or pronaos, in which, as in that of the temple of Jupiter Olympius at Athens, the columns were probably three deep; SOCIETY OF DILETTANTI, *Ionian Antiq.*, fol., London, 1769, i, 47. 25.

PRONI. The plural of the *Lat.* pronus. This remarkable term occurs in the following passage in the *Consuetudinis Monasterii S. Germani à Pratis*; "abbas—ibit in sacrarium —et trabet se versus pronos ad dicendum suum *Confiteor*", given in MARTENE, *Ant. Eccl. Rit.*, fo., Venice, 1783, iv, 139 (being his *Mon. Rit.* 3, xiv, 29), where he explains "pronos" as "trabes per ecclesiæ transversum, super quas cerei accendebantur"; (ECCLESIOLOGIST *Journal*, 1849, ix, 169); the corbels, for such a beam going across the church to support lighted candles, appear to remain in the eastern jambs of two opposite windows in the chancel of the church at South Hayling, Hampshire. VIOLLET LE DUC, *Dict.*; s. v. Trabs.

PRONTI (GIOVANNINO), finished 1777-80 the façade of the church of S. Marco at Florence.

PROOF; see TESTING.

PROP. An underset or supporter, usually applied to timber work. The word is applied to "The little bells under the triglyph", *i.e.*, the guttæ, in MOXON, *Mechanic Exercises*, 12mo., London, 1702, p. 34. RANCE. SHORE. 4.

PROPERTY. Landed property in the United Kingdom is of three sorts; freehold, COPYHOLD, and LEASEHOLD. *Freehold* property is an estate belonging unconditionally to its owner. LOW, *Landed Property and the Economy of Estates*, 8vo., London, 1856. Lord St. LEONARDS, *Handybook on Property Law*, 8vo., 1860. WOODFALL, *Treatise on Landlord and Tenant*, 7th edit., 8vo., 1856. KINNEAR, *Principles of Property in Land*, 8vo., London, 1880. TARBUCK, *Handbook of House Property; Houses and Land, Valuation, etc.*, 12mo., London, 1875. LAND TAX. 14.

PROPHETEUM and Prophetæum. A late Latin word used to denote a church dedicated to a prophet. BINGHAM, *Origines Eccles.*, 8vo., London, 1840, ii, 351. 13.

PROPHYRUM, prophoron, prophurum. A balcony. SALMASIUS in SPARTIANUS, *Hist. Aug.*, 8vo., Lug. Bat., 1671, p. 676-7.

PROPIGNEUM; see PROPNIGEUM.

PROPITIATORIUM, umbraculum, tegimen altaris; see CIBORIUM.

PROPNIGEUM. The furnace to the sweating place in the Greek gymnasium. VITRUVIUS, v, cap. 11. The word is sometimes written propigneum, as in GWILT, transl. of Vitruvius; and in his *Encyc.* HYPOCAUSIS. It is the same as PRÆFURNIUM.

PROPORTION. In design, a system of proportion of parts to the whole. The earliest writer on the subject is VITRUVIUS, who, i, 3, and iii, 1, concludes with the remark that no "building can be said to be well designed which wants symmetry and proportion". The principle to be gathered from his work is that now called the INTERAXAL SYSTEM. In GWILT, *Encyc.*, edit. 1867 and 1876, several sections are devoted to this system, chiefly derived from DURAND, *Précis d'Architecture*, 4to., Paris, 1819-21; and remarks on proportion based upon fitness (GWILT, p. 796). VITRUVIUS also used a MODULE, being a unit or standard of length, such as the semidiameter of the column, for determining the proportions of a work. The laws of proportion in ancient classic works were carefully investigated by CRESY, *Encyc. of Civil Engineering*, 1848, reprinted in GWILT, *Encyc. of Arch.*, edit., 1867 and 1876: and certain buildings as;—HAY, *Principle which Governs the Proportions and Curves of the Parthenon*, etc., at Royal Inst. of Brit. Architects, 7 Feb. 1853; and *Orthographic Beauty of the Parthenon referred to a Law of Nature*, 8vo., Edinb., 1853: JOPLING, *Key to the Proportions of the Parthenon*, 8vo., 1855-6: *The Parthenon*, by PENROSE, at R. I. B. A., 5 Feb. 1877, p. 101-112; and LLOYD, *General Theory of P. in Arch. Design*, 4to., 1863: also BUILDER *Journal*, xvii, 571. *The Temple of Diana at Ephesus*, by FERGUSSON, 1877, p. 96. *Mausoleum of Halicarnassus*, by FERGUSSON, 4to., 1862.

PENNETHORNE, *The Elements and Mathematical Principles of the Greek Architects; Analysis and Study of the Remaining Works Designed in the Age of Pericles*, 8vo., London, 1844: his *Geometry and Optics of Ancient Architecture, Examples from Thebes, Athens, and Rome*, fol., London, 1878: and lecture at the Roy. Inst. of Brit. Architects, Feb. 10, 1879.

The Renaissance period produced the following works: F. COLUMNA or COLONNA, *Hypnerotomachia*, 4to., Venice, 1499; and the French edition of Paris, 1561. PACIOLI, *Divina Proportione, et libellus Corporum Regularium et Dependentium, activæ Perscrutationis*, 2 vols., fol., Venice, 1509. PACIOLI, *Summa de Arith., Geom., Prop., et Propor.*, fol., Venice, 1494; Tusc., 1523; 1567. DANTI, *Il primo libro del tratto delle perfette proporzione, etc., con l'arte del disegno*, 4to., 1567. SERLIO, *Architettura*, fol., Ven., 1551; 1663, lib. 1. BORROMINO, *Opera cavata, etc., e con lo studio delle Proporzione Geometriche*, fol., Rome, 1720. PIEDA DE VASCONCELLOS, *Artefactos Symmetriscos e Geometricos, pela perfeiçao das Artes, Esculturaria, Architectonica e da Pintura*, fol., Lisboa, 1733. CRISTIANI, *Della media armonica proporzionale da applicarsi nell' Arch. Civile*, 4to., Brescia, 1766. BARCA, *Saggio sopra il bello di P. in Archit.*, 4to., Bassano, 1806.

The Egyptian canon of proportion by squares for heads and columns, is explained in *Description de l'Egypte*, iv, pl. 62; the metrical system is comprised in vol. vii, *texte;* proportions at Edfou, i, 339. For figures, at Koum Ombos, fol., 1820, i, pl. 44: in *Handbook;* and at Kalabsheh, in EDWARDS, *Up the Nile*, 8vo., 1877, ii, 421, 552. WILKINSON, *Ancient Egyptians*, 8vo., London, 1837 and 1841; and *Architecture of Ancient Egypt, etc.*, 8vo. and fol., London, 1851. Of *Hindostan;* RAM RAZ, *Essay on the Arch. of the Hindus*, 4to., London, 1834, who, p. 15, writes, "Woe to them who dwell in a house not built according to the proportions of symmetry".

The poems of S. Paolino, written A.D. 402, refer to the mystery of the Trinity, in the design of the basilica at Nola; COCKERELL in HARFORD, *Life of Buonarroti*, fol., 1857, p. 4. ROLFE, in CHURCH BUILDER *Journal*, 1876, p. 217-8 refers to the science of numbers from the time of Constantine.

The early use of a system in *mediæval design* is traced to the XIII cent., as in the *Album of Wilars de Honecort*, published by LASSUS in 1858. Some drawings dated 1270 of Reims cathedral, noticed s. v. DRAWING, exhibit axial lines only. The use of the triangle was continued in France until the beginning of the XV cent. when the isosceles triangle and its compound the pentagon (PENTALPHA) was introduced, as in the rose window of

the north transept executed by the pupil, while that in the south transept was done on the triangle, by the master Berneval; GWILT, 967; from POMMERAYE, *Hist.*

That some system must have existed in the design of Siena cathedral, is proved by the discussions which took place in 1321, as related in DELLA VALLE, *Lettere Sanesi*, ii, p. 60; and HAWKINS, *Gothic Arch.*, 1813, p. 183. Great disputes arose in the planning of Milan cathedral 1387-92, on the foreign system of squares or the native theory of triangles; and on another occasion in 1401, when the triangular system prevailed, as is probably truly exhibited in the edition by CESARE CESARIANO of VITRUVIUS, fol., Como, 1521.

On the law of the square is founded the work by RORICZER, *On the Ordination of Pinnacles*, 1486, printed by HEIDELOFF, in *Die Bauhütte des Mittelalters in Deutschland*, 4to., Nur., 1844, and in modern German by REICHENSPERGER, Trier, 1845: it was noticed in the *Journal* of the Archæological Institute of Great Britain, 1847; and translated in a concise manner by J. W. PAPWORTH in *Detached Essays*, 1848, with illustrations; and *On the Construction of a Canopy*, from the work by HEIDELOFF, who also gives, p. 95-9, *Geometria Deutsch.*, by Hans HÖSCH von Gmünd, 1472; and relates that the *chef d'œuvre* of Kieskalt, the last city architect (1806) of Nuremberg, was founded on the rules shown in Roriczer's work and those in the book of instructions written 1506 by L. Locher on the art of the stonemason. In 1525 Albert Dürer published his *Geometrical Elements;* also Paris 1532; and Arnheim 1606; wherein the figure called VESICA PISCIS appears, following the 1521 edition of *Vitruvius*. STIEGLITZ, in *Altdeutscher Baukunst*, 4to., Leipzig, 1820, records the possession of a *Treatise on Architecture* in manuscript, which, in a handwriting of the XVII cent., records the ancient use of an established *module*. The choir is considered as the key, thence the saying of the ancients, "the measure of the choir and of justice". FÖRSTER, *Vorschule der Kunstgeschichte*, Leipzig, 1862, p. 128, notices a "golden rule or division". HOFFSTADT published *Gothisches A B C Buch*, 4to., Frankfurt, 1840. POPP of Bamberg, in the ALLGEMEINE BAUZEITUNG, 1845, pl. 649-53, developes the use of the square on the plans of Cologne, Strassburg, Bamberg, and S. Denis; the elevations on the triangle; the plan and elevation of Ratisbon both on the triangle. HENSZLMANN in 1852 (BUILDER *Journal*, x, 795), alleged that he had discovered the old constructional laws, using geometric forms; and published the first portion of his system *Théorie des Proportions*, fol., Paris, 1860. The report by Lenoir on this system is given in DALY, *Revue Générale*, 1859, and translated in BUILDER *Journal*, 1859, xvii, 483: also a *report* upon it by a committee of the Institute of British Architects, was read 7 Feb. 1853.

In *England*, SPENSER, *Faery Queene*, 1589, alludes to the circle, triangle, square, and proportion by 7 and 9; and in 1593 Sir T. Tresham erected the lodge at Rushton Hall, Northamptonshire, on the equilateral triangle, having an hexagonal room with upper windows mostly triangular. The investigation was perhaps commenced by HAWKINS, *Origin of Gothic Architecture*, 8vo, 1813, p. 169-198, who drew attention to the facts recorded in the 1521 edition of VITRUVIUS of the systems "a trigono" and "a pariquadrato", and reengraved the diagrams by CESARIANO of the plan, etc., of Milan cathedral; KERRICH read a paper Jan. 1820, at the Society of Antiquaries, describing the use of the form called *vesica piscis* (ARCHÆOLOGIA, 1821, xix, 353); and BROWNE of York read there two papers in 1828 thereon (GENTLEMAN'S MAGAZINE, ii, 553; BUILDER *Journal*, 1847, v, 393). BILLINGS, *Attempt to Define the Geometric Proportions, etc.*, 1840, exhibits the use of the square in Norman work, of the circle and its parts later, as at Carlisle cathedral. Prof. COCKERELL in his 'Lectures' at the Royal Academy in 1841, and also in the ARCHÆOLOGICAL JOURNAL, 1845, adverted to the old rules laid down by CESARIANO. GRIFFITH, 1843-52 published numerous essays on the subject of *Geometrical Proportion*, showing the use of the *triangle*, as at Westminster abbey, where trefoils, hexafoils, dodecafoils, etc., abound; and as at Salisbury cathedral, the square and its products, as tetrafoils, octafoils, etc., are chiefly employed. HARRISON of Oxford, *On the Proportion of Chancels*, read at Oxford Arch. Society, March 2, 1842, printed in ECCLESIOLOGIST *Journal*, 1842, i, 107, urged that the sizes were guided by the breadth of the nave, etc.; that the position of the church and the objects surrounding it, were attended to; and that exactly similar proportions are found in all churches on the same plan but of different dates, showing the use of fixed rules: and referred to PETIT. CHANTRELL in 1842 had developed a system arising from the free use of the circle and circumscribed triangles (BUILDER *Journal*, 1847, v, 300), and another in 1847. CRESY published the results of his long investigations in his *Encyc. of Civil Engineering*, 1847; which were reprinted and added to in GWILT, *Encyc. of Architecture*, 1867, and 1876. PENROSE 1848, in ARCHÆOLOGICAL JOURNAL, referring to Lincoln cathedral, used squares for the plan, and the triangle for the section; and to other edifices. HAY of Edinburgh published several treatises, as *Prop., or the Geometric Principle of Beauty analysed*, 4to., 1843; and the *Harmonic Law of Nature applied to Architectural design*, 8vo., Edin., 1855 (B. N. *J.* 1874, xxvii, 364). WHITE published in the ECCLESIOLOGIST *Journal*, 1853, that each architectural period had its own appropriate order of rules; thus in the Norman period, the square for the plan, and the triangle for the minor parts; later, the triangle for both; and in the middle of the XIV cent. the diagonal square was set up; and then the diagonal of a square (BUILDER *Journal*, 1853, xi, 652, 683). Sherborne church, Dorsetshire, a fine Perpendicular building, is stated to be designed on the triangle; R. I. B. A, *Sessional Paper*, 1877, p. 151.

On Proportion generally, BUILDER *Journal*, 1864, xxii, 904; 1867, xxv, 161, and 1874, xxxii, 188; 1871, xxix, 637 and 657; 1876, xxxiv, 679 by W. C. THOMAS; and 454; 719. BUILDING NEWS *Journal*, 1876, xxxi, 224. *Human Symmetry*, in ART, PICTORIAL AND INDUSTRIAL, 1872. PULLAN, *On Style and Proportion in Gothic Architecture*, B. *J.*, 1876, xxxiv, 454, urging the triangle; and printed in B. N. *J.*, xxxi, 479. Dr. BELL (of Manchester), *Geometric Principles of Ancient Architecture*, B. *J.*, 1851, ix, 165. THOMAS, *Metronomy, or Laws of Proportion*, read at Associated Arts Institute, in B. N. *J.*, 1869, xvi, 337. VIOLLET LE DUC, *Dict.*, s. v., cathedrale, p. 466; measure; module; metre; échelle; proportion; and style p. 483. ROEBER, *On the Key to the Proportions of Cathedrals, Pyramids, and Egyptian Architecture*, Dresden, 1835-40. FREEMAN, *Prop. of Gothic Architecture*, 8vo., Cambr., 1848. *Lectures on Painting*, by the Royal Academicians, 8vo. (Bohn), London, 1848; and REYNOLDS, *Discourses*. FOLIATION. MOULDING. TRACERY. HARMONIC PROPORTION. MODULE. INTERAXAL SYSTEM.

PROPORTION by NUMBERS and MEASURE. The number 10 was, according to VITRUVIUS, the perfect number of Plato; but the anti-Platonists with their radial 6, or the radial division of the circle, could by the working of the centres, without the necessity of dividing with the compasses, produce the 10, showing they were the more perfect, as their system combined with all others. In the churches where the Latin cross was adopted for the plan, the numbers 3, 5, and 7, became the governing numbers of the different parts of the building. Even before the XIII cent. there seems to have been some relation between the number of bays into which the nave was longitudinally divided, and the divisions of the apse, whether decagonal, octagonal, nonagonal, etc. The practice also existed of regulating the details from the sides in the apse or bays in the nave. Reference to examples will be found in GWILT, *Ency.*, edit. 1867, p. 964-5-9; and 973; RAMÉE, *Hist. de l'Arch.*, 8vo., Paris, 1843; VIOLLET-LE-DUC, *Dict.*, s. v., Symmetrie. COCKERELL in ARCHÆOLOGICAL JOURNAL, 1845, p. 32, 39-40, refers to the *numbers* employed by William of Wykeham in the plans of his chapels at Winchester and Oxford, which are divided by 7, and transversely by 4, equal parts. The recurrence of the number 7, a "number of perfection", is constant in mediæval buildings.

as at Cologne cathedral, according to BOECKER's observations. (BUILDER *Journal*, 1861, xix, 22.) BATES, *History and Mystery of the three, or triple system of the Ancient Egyptians, etc., etc.*, 8vo., 1853, 2nd edit. CRESY accounts for the difference of dimensions between the English and French cathedrals from X to XV cent., as arising out of two standards of measurements; those of England were set out with the English perch of 16 ft. 6 ins.; those of France by the French perch royal of 22 pieds du roi, equal to 23·452 English ft. A few exceptions at Bayeux, Caen, S. George Bocherville, S. Ouen at Rouen, are set out with the English perch of 16 ft. 6 ins.; these are universally attributed to English constructors. DE LASSAULX, in WHEWELL, *Arch. Notes*, 8vo., London, 1842, 3rd edit., p. 154, remarks that German churches were set out with the Rhenish standard measure, each foot being equal to 139·13 Paris lines; that all the dimensions consist of round numbers, etc. He considers that the ancient Greek foot was used for the buildings at Treves, of the age of Constantine. The old Roman foot was used in Cologne cathedral; BOISSERÉE, *Hist. de Col.*, text, 4to., Munich, 1843, p. 33, new edit. A table of the churches in Durham is given by BILLINGS, *Arch. Antiq. of County of Durham*, 1846, showing the use of the cubit (?) or half a yard, and yard square DE LASSAULX, p. 179, gives particulars of the dimensions of the church of S. Florinus at Coblentz, whose nave, he states, has uncommonly beautiful proportions, evidently the result of numerical calculations. It has been noticed in WEALE, *Handbook to London*, 1851, p. 150, that in Westminster Abbey the French system of heights was followed.

WILLIS, *Mitred Abbies*, etc., 8vo., 1718-19, ii, viii, notices that the height of most abbies is equal to the breadth of the body and side ailes. Steeples and towers are usually as high as the length of the whole fabric, or rather of the transepts. The transepts extended half the length of the whole fabric, as did the nave from the door to the tower; the ailes were half the breadth and height of the nave. Remarks as to Worcester cathedral are given in GREEN, *History*, 4to, 1796, i, 48; in STORER AND GREIG, *Cath. churches*, 8vo., 1814-17-19, sig. k; and at the Worcester meeting of the Archæological Society, p. 391, 414. "It is a comfortable conclusion to the practical architect that the empirical rules of Vitruvius, the harmonic, the geometrical and arithmetical rules of Alberti and his followers, agree in the main, so that either may be adopted without material deviation from correctness," wrote the late professor Cockerell, in lecture VI at the Royal Academy, 1843.

PROPORTION of column; see SHAFT. DIMINUTION.

PROPORTIONAL COMPASSES (Fr. *compas à reduction*). An instrument having two pair of points moveable on a shifting centre, to regulate the proportion of one end to the other. They are used in enlarging or diminishing drawings. CASATI, *Fabrica et uso del compasso di proportione*, etc., 4to., Bol., 1664. ROBERTSON, *Mathematical Instr.*, 8vo., London, 1775, preface. 1.

PROPPING; see SHORING.

PROPRIETARY CHAPEL. A chapel built by private funds or by subscription, the pew rents being devoted to pay the rector of the parish a yearly stipend for performing divine service; PHILLIMORE, *Eccles. Law*, 8vo., London, 1873, p. 1183; 1834: or to pay the incumbent elected or appointed by the proprietors.

PROPYLÆA. The Gr. term for any court or vestibule before a building; or before its principal part; but more particularly the entrance to such court flanked by buildings. Examples remain at the acropolis at Athens, by Mnesicles 437-432 B.C., partly blown up by gunpowder 1656; two at Eleusis, where the one to the outer enclosure was erected in imitation of that at Athens, but without the wings (DALY, *Revue Générale*, 1867, xxvi, 50 and plates); and at Sunium. PAUSANIAS, ii, 3, mentions some at Corinth. The entrance to the court of the temple of the Sun at Palmyra. The gateways remaining at Persepolis, seen on ascending the platform, were erected by Xerxes, and are restored into a propylæum 82 ft. square inside, by FERGUSSON, *Palaces, etc., restored*, 8vo., London, 1851; and in CIVIL ENGINEER, ETC., *Journal*, 1851, xiv, 231: a different arrangement of them, however, is shewn in FLANDIN AND COSTE.

In the writings of the old Greek Christians the word propylæum is applied to the porch of a church or basilica; BINGHAM, *Origines*, viii. 2. 14 supp. 78.

PROPYLON. The Gr. term for a vestibule. PYLON.

PROSCENIUM. The Gr. term for that part in the ancient theatre whereon the actors performed in front of the scena. The Romans called it "pulpitum". The logeion and proscenium composed the "hyposcenium". DONALDSON, *Greek Theatre*, in STUART, *Antiq.*, fol., London, 1830, Supp. vol. iv, 41-3. SCHLEGEL describes proscenium as a recess in the central part of the scene. BULLINGER says that "in Greece the scene was higher than the proscene, and the proscene than the pulpitum (the *thymele*, that is), which stood in the orchestra". VITRUVIUS seems to use it for the whole space in front of the scene; and it may then be divided into the *logeion*, that small portion opposite the centre of the scene where the actors stood and spoke, and the broader portions on each side, up to the seats of the spectators.

The term is also used in modern theatres for the portion of the stage in front of the curtain or drop scene, between it and the orchestra, and "under the sounding board". (Fr. *avant-scène*; its ceiling, *ecintre*.)

PROSCHOLIUM. A term applied to the covered walk of the Divinity school at Oxford, formed when the Bodleian library was designed 1610, by T. Holt; ARCHÆOLOGICAL JOURNAL, 8vo., London, 1851, p. 385.

PROSERPINA (Gr. *Persephone*). The daughter of Zeus and Demeter, and the wife of Pluto, the god of Hades, the region of the dead. She is mostly represented in the act of being carried off by Pluto. The cella of the temple to Proserpine and Ceres at Eleusis was designed B.C. 440 by Ictinus; it is of large size, for the greater convenience of celebrating the mysteries. The external Doric prostyle portico was added B.C. 318 by Philo; VITRUVIUS, vii, pref.; who i, 2, notices that the Corinthian order is more appropriate. Remains of a temple exist at Messene in Asia Minor; BLOUET, *Morée*, fol., Paris, 1834-36: others at Corinth, Megara, Sparta, and at Locri in South Italy. The columns of the temple near Hipponium or Vibo were carried off in XI cent. by count Roger to adorn his cathedral at Mileto in Calabria Ultor II.

PAUSANIAS does not mention any temple to Pluto in any part of Greece; there was a statue to Pluto in the temple of the Eumenides on the areiopagus at Athens; and another in the temple at Olympia. 14. 78.

PROSPECT. The pleasantness or comfort of an apartment must be dependent very much upon this and upon ASPECT. KERR, *Gentleman's House*, 8vo., London, 1871, 3rd edit., 79. LIGHT AND AIR. PRESCRIPTION.

PROSPECT CHAMBER. One of the apartments mentioned in the list of those at Hengrave Hall, Suffolk, 1603: a "chamber under" is also named, showing it was on the upper floor. BELVEDERE. GAZEBO.

PROSPECTIVE WORK. One of the eight ways in which LEADWORK was divided, as shown and named in HOLMES, *Academy of Armory*, fol., Chester, 1688, ii, p. 385.

PROSTAS, parastas, pastas, and also prodomos. The Gr. terms for the passage which separated the 'thalamas' or bed chamber from the 'antethalamas' or ante chamber. PARASTAS. SMITH, *Dict. Ant.*, p. 425. 78.

PROSTASIS. A term applied to the entrance portico on the south side of the Erectheium at Athens; that on the north side is also called "stoa" in the architectural inscription. SOCIETY OF DILETTANTI, *Antiq. of Ionia*, fol., London, 1840, iii, 28-9, uses the word "prostasis to express what modern architects improperly denominate 'portico'; this last term signifies something placed in advance at the east and west ends of a temple or building, without necessarily implying that it stood in advance of some entrance".

PROSTOON. The Gr. term for one of the porticoes of the peristyle or court of the andronitis, probably that nearest the entrance (PLATO, *Protag.*, 314, 315). These porticoes were used for exercise and sometimes for dining in. SMITH, *Dict. Ant.*, art. Domus, 425. 78.

PROSTUPA; prostype or protype. (Gr.) A term used by Dioscorides, meaning alto-relievo; though *ectype* is generally supposed to be high relief; and *prostype* low relief, as cameo work. ECTYPE. PROTUPON.

PROSTYLOS and PROSTYLE. The Gr. term for a temple having columns only in front; AMPHIPROSTYLE when there was also a portico at the other end of the temple. STOA. WILKINS, *Prolusiones*, 4to., London, 1837, p. 18-9.

PROTECTION to wood from fire; see FLAMMABILITY; and INCOMBUSTIBLE.

PROTECTUM. A term for a kind of balcony. SALMASIUS in SPARTIANUS, *Hist. Aug.*, 8vo., Lug. Bat., 1671, p. 676.

PROTHESIS, Table of; see CREDENCE.

PROTHESIS, paratorium, preparatorium, oblationarium, offertorium, secretarium, sacrarium or corban, vestiarium, and thesaurus. The late Latin name for the recess on the right hand or south side of the *bema* or apse in a basilican church, where the offerings of the people were received, and out of which the bread and wine were taken to be consecrated; BINGHAM, *Origines*, 8vo., 1840, ii, 457. It was also used for the holy vessels.

PROTHURON or PROTHYRON. The Gr. term (VITRUVIUS, vi, x; HEROD., vi, 35) for a porch, vestibule, or space *before* an entrance. The Romans called *prothyrum* what the Greeks called *diathyrum*, a term which has puzzled commentators. MAZOIS, *Pompéi*, fol., Paris, 1824, ii, 18, was the first who suggested it might be the passage, also called proaulion, leading from the door to the atrium in a house, as shown at A in woodcut s. v. ATRIUM. A passage leading from the public road to the door of a palace, or of any private house of a superior description, was called *vestibulum* and prothuron; it was provided with seats. Here persons waited in the morning; SMITH, *Dict. Ant.*, s. v. Janua, 627 *a*. JULIUS POLLUX, *Onomasticon*, 1, cap. 8; sec. 76, 77, on passing the entrance door and proceeding to enter the house, gives two different names for the OSTIARII, or the porter's lodge, and two for the entrance passage, πρόδομος or προαύλιον, literally ante-house or ante-hall. Some later writers use prothyrum and porteria for the interior vestibule or arcade at the entrance to the atrium of a basilica. INWOOD, *Erechtheion*, fol., London, 1827, p. 55-6; 63; 65; and in 84, notices the prothuron of Ceres Thesmophorus at Ægina, to which a captive fled, and laid hold of the rings of the gates; the captors cut off his hands, leaving them fastened to the rings; HERODOTUS. 78.

PROTHYRIDES; see ANCON; CROISETTE; and EAR.

PROTHYRIS. The Gr. term signifying a cross beam or overthwart rafter; also a quoin or course of stone in a wall. 1. 4.

PROTO-DORIC. The column at the rock-cut tombs at BENIHASSAN (woodcut s. v.), of XII dynasty (LEPSIUS, B.C. 2330), have a rude resemblance to a Doric column, but have not the echinus or other mouldings to the capital or cornice. They were first sketched by the late Sir C. Barry, R.A. There are both 16 and 8 sided columns, some fluted, with an abacus and plain architrave. Similar examples occur in the rock-cut temples of Nubia, of the age of Rameses II. Some Egyptian columns much resembling the Doric, in the southern temple at Karnak and elsewhere, are described by FALKENER, *Museum of Classical Antiquities*, 8vo., London, 1851-2, i, 87, dating at least 1400 B.C., having 32 flutes. FERGUSSON, *Handbook*, etc., 1855, i, 224-6; 258. DALY, *Revue Générale*, 1857, xv, 4-8. LLOYD, *Age of Pericles*, 8vo., London, 1875, i, 242. BUILDER *Journal*, 1860, xviii, 94-7; xix, 51; BUILDING NEWS *Journal*, 1861, 197. PENNETHORNE, *Geometry and Optics of Ancient Architecture*, fol., London, 1878. LEAKE, *Travels in the Morea*, 8vo., London, 1830, iii, 268-84. FREEMAN, *Hist. of Arch.*, 8vo., 1849, p. 103-4. DORIC ORDER. EGYPTIAN ARCHITECTURE (p. 20). GREEK ARCHITECTURE. PRATT, *The Origin of the Doric Order*, in *Proceedings* of The American Academy of Arts and Sciences; and in ARCHITECT *Journal*, 1880, xxiv, 191.

PROTOGINE. The French term for a granite composed of felspar, quartz, and talc.

PROTO-IONIC at Khorsabad; PENNETHORNE, *Geometry, etc.*, FERGUSSON, as in above article.

PROTOTYPE. The Gr. term for an original work; thus the clay model is the prototype of the statue to be afterwards executed in marble.

PROTOXIDE PAINT; see METALLIC.

PROTRACTOR. An instrument of various forms, used in laying down angles in drawing or plotting. FROME, *On Trigonometrical Surveying*, 8vo., London, 1840. The "Blade protractor", registered 1847 by J. Basire, is drawn in CIVIL ENGINEER, ETC., *Journal*, 1847, x, 310. 14.

PROTUPON, before, or bas-relief; or protypum (PAUS.). The name first given by Dibutades to the masks at the ends of the imbrices (PLINY); see ECTYPE or sunk in. PERSONÆ. ANTEFIXÆ. PROSTUPA. DALY, *Revue Générale*, 1858, xvi, 161.

PROTYPE or PROSTYPE; see PROSTUPA.

PROVAGLIA (BARTOLOMMEO); see BOLOGNA. He died (1372 an error for) 1672. BOLOGNINI, *Vite*, 8vo., 1841, v, 400. 105.

PROVENCE, or the provençal, or Romanesque architecture of Southern France; see FREEMAN, *History of Arch.*, 8vo., London, 1848, p. 219. FERGUSSON, *Ill. Handbook*, 8vo., 1855; and 1865-67. FAURI S. VINCENS, *Divers Monumens*, 4to., 1805. FAVRE, *Histoire de P.*, 8vo., 1832-37. HUGHES, *Itin. de P.*, 8vo., 1822. MONCONYS, *Travels*, 8vo., 1677. *Recueil de pièces remarquables sur la P.* PÉRIGUEUX, and other towns.

PROVING or PROOFING; see TESTING.

PROVISION. An amount of money, or a quantity of material, included in an estimate to meet a possible requirement or contingency, while the edifice is in course of construction. EXTRA-WORK. OMISSIONS. INVALIDITY. CONTRACT.

PROVISOR of the works, purveyor, or supervisor. A title born by Thomas Chamberlayn, at the palace of Westminster. The Fabric rolls of 1365-6 name the four officers, as clerk of the works, controller, provisor, and surveyor of the labourers; BRAYLEY AND BRITTON, *History*, 8vo., London, 1835, p. 198. F. Lapi, or Brunellesco, was appointed provisor of the cupola to the church of Sta. Maria del Fiore at Florence, which was commenced 1421 (as s. v. Lapi).

PROVOST (JEAN LOUIS), born 27 October 1781 at Paris; was a pupil of C. Percier. In 1811 he gained the first grand prix. He restored the salle Montpensier; the hôtel de Montebello; the hôtel de Galifet; and other large edifices. He designed the tomb to marshal Lefebvre in the cimetière de l'Est, or de Père-la-Chaise (NORMAND, *Monumens funèbres*, etc.) In 1820-34 or 36 he was architect to the chamber of peers or palais du Luxembourg, succeeding Baraguey. DALY, *Revue Générale*, 1842, iii, 349; LANCE, *Dict. Biog.*, 1872. 110.

PROW or beak. (Gr. πρῶρα or μετωπον). The head or forepart of a ship. It is often introduced in sculptural decoration of a naval character; the columna rostrata was so adorned in memory of some noted battle at sea. The most important and celebrated yet remaining is that of C. Duillius at Rome, B.C. 261: it is now preserved in the museum of the Capitol. SMITH, *Dict. Ant.*, s. v. Navis; and s. v. Columna. STEEN or πρυμνη. 78.

PRUDDE (JOHN), of Westminster, glazier 1447, covenanted to glaze the windows of the Beauchamp chapel, Warwick; as given in BRITTON, *Arch. Antiq.*, 4to., 1814, iv, 11. 19.

PRUDHAM or PRUDHOLME QUARRY. A quarry near Hexham, in Northumberland. The stone is from the coal measures, and is much used for building. Another quarry of the same name, situated near Four Stones, Newcastle; it is also called Warden stone, being situated in the parish of that name. It is locally termed 'white stone'; is of the millstone grit formation; is 40 ft. thick; and was used in the central stations at Newcastle and Carlisle; in docks, etc. *Memoirs*

of the Geological Survey; *Mining Records* by Hunt, 8vo., 1860, p. 254-5.

PRUNUS comprises the apricot, bullace, cherry, damson, plum, and sloe. The wood of the plum tree is handsome, and is similar in general character to the pear tree (PYRUS); it is used principally in turning; and frequently in Tunbridge ware. In the endway of the grain it resembles cherry tree, but the old trees are of a more reddish brown with darker marks of the same colour. The wood is very wasteful, as it begins to rot in small holes generally away from the centre of the tree. CERASUS or wild cherry tree.

PRUSSIAN BLUE, also called Berlin blue, and Paris or Parisian blue; prussiate of iron, or cyanide of iron. It was accidentally discovered by a chemist at Berlin; was described in *Berlin Memoirs*, 1710; and by Woodward at Royal Society, 1724, PHIL. TRANS. *Abr.*, vii, 747, etc.; four different processes of manufacture in Hist. of the Acad. of Sciences at Paris, 1756, are detailed in CHAMBERS, *Encyc.*, fol., 1786. *Bleu*, in LEFEBVRE LABOULAYE, *Encyc. Technologique: Dict. des Arts*, etc., 2 vols., 8vo., Paris, 1845-47. The colour is produced by a combination of prussic or hydrocyanic acid, iron, and alumina; or, the requisite carbon and nitrogen are obtained by decomposing animal matter in contact with potash; but the processes are kept as secrets by the manufacturers. A pure perferrocyanate of iron was obtained from potash or pearlash, and coke, cinders, or coals and iron turnings, by L. Thompson, who was rewarded by the SOCIETY OF ARTS; it was described in *Transactions*, 1837-38, lii, 25.

Prussian blue is a deep and powerful blue, of great body and transparency; more useful in water than in oil; lasts a long time under favourable circumstances; fades under a strong light; becomes darkened by damp or impure air; becomes greenish by a development of the yellow oxide of iron; and is destroyed by limes and alkalies. "Its durability might have been suspected, from the vegetable and animal matters used in its preparation, if the colour did not seem fixed by the operation." It is related of T. Stothard, R.A., that while in 1828 pointing to a picture painted by him with Prussian blue in 1802, he said, "it had not flown in the least"; PROCTER, *Auto. Fragments*, etc., 8vo., London, 1877, p. 86. There is little doubt that the Prussian blue of the present day is not so "bright, deep, and cool", and lasting, as that manufactured in the last century. HUNT, *Present System of obtaining Materials, etc.*, in SOCIETY OF ARTS *Journal*, 1880, p. 485-99. 9. 13.

"Blue ochre" is improperly called "native prussian blue". "Light prussian blue" is also called ANTWERP BLUE, and HAERLEM BLUE, when containing more alumina.

PRUSSIAN GREEN. An imperfect prussiate of iron, or Prussian blue in which the yellow oxide of iron superabounds, or to which yellow tincture of French berries has been added. A better sort is said to be obtained by precipitating the prussiate of potash with nitrate of cobalt. 9.

PRUSSIAN RED or English red, is the same as VENETIAN RED or scarlet ochre. Many other colours with the prefix "Prussian" are described in FIELD, *Grammar of Colouring*, 12mo., London, 1858. 9.

PRYTANEIUM. The common centre of every ancient Greek city, in which the sacred fire was kept burning; and by the Romans called the temple to Vesta. Before the time of Theseus, *cir.* B.C. 1235, each hamlet of Attica had its separate prytaneium; but he founded that of Athens as the religious centre of the whole of Attica. The edifice had many different destinations; there, were lodged the fifty prytanes (senatus administratus of the laws) during their terms of office; citizens who had deserved well of their country received as a national recompense the privilege of being therein maintained at the cost of the state; or of only receiving their meals at the public cost; foreign ambassadors and all those towards whom the state desired to exercise hospitality were also entertained there. PAUSANIAS mentions it as being near the enclosure of Aglaurus, at the foot of the Acropolis, and it is identified by LEAKE with its north-east angle. BRETON, *Athènes*, 8vo., Paris, 1868, p. 258. ROQUE, *Top. d'Athènes*, 12mo., Paris, 1869, p. 164. FUSTEL DE COULANGES, *La cité antique*, 12mo., Paris, 1870, p. 171. A design in restoration of such an edifice, by J. B. A. Labadie, obtained a grand prix 1800; ALLAIS, etc., *Projets d'Arch.*, fol., Paris, 1806, pl. 89-91. A. C. 78

PSELCIS, now represented by Dakkeh or Dekkeh, in Nubia, situated on the river Nile. The temple, which faces the north, was founded by Ergamen, an Ethiopian king, who built the central chamber, the original adytum; Physcon or Euergetes II erected the portico 'in antis', and probably the present adytum; Augustus has also left his mark, but a great part is unfinished. GAU, *Nubie, etc.*, fol., Paris, 1822, pl. 33-8. CHAMPOLLION, *Lettres, etc.*, p. 150. ALLAN, *Mediterranean, etc.*, fol., London, 1843, p. 66, etc. RAMÉE, *Hist. de l'Arch.*, 12mo., 1843, i, 212. EDWARDS, *Up the Nile*, 8vo., 1877, ii, 537. 28.

PSEUDISODOMUM OPUS. Bedded work in courses of unequal height. The second of the three sorts of ancient Greek masonry. VITRUVIUS, ii, 8. ISODOMUM. EMPLECTON.

PSEUDODIPTERAL. A temple constructed with eight columns in front and rear, and with fifteen on the sides, including those at the angles; the side walls of the cella are placed opposite to the four middle columns of the front and of the rear, the inner row of columns being omitted. Hence from the walls to the lower part of the outer row of columns, there will be all round the cella, a space equal to two intercolumniations and one column. No example of such a temple is to be found in Rome, but of this sort was the temple to Diana in MAGNESIA by HERMOGENES; and that of Apollo by Menesthes; VITRUVIUS, i, 3. This arrangement was the invention of Hermogenes for saving expense and affording more space (ii, 3). DIPTERAL. POSTICUM.

PSEUDOPERIPTERAL. An arrangement of a temple, as described in VITRUVIUS, iv, 7, "which by placing the walls of the cella between the intercolumniations of the pteroma, gave more space to the cella, preserving in other respects the same proportions and symmetry". GWILT, *Encyc.*, Glossary s. v. Temple, describes this sort of temple as one "in which there is no passage round the walls of the cella, but an appearance of surrounding columns", *i.e.*, of semi-columns attached to the side walls of the cella. The maison carrée at Nismes is an example of an hexastyle pseudoperipteral temple.

PSEUDOPROSTYLE. A portico projecting less than an intercolumniation; a term used by HOSKING.

PSEUDOPSIS, or false vision of colour; see CHROMATOBLEPSY.

PSEUDOTHYRUM. A term used by CICERO, *Orat. post Red.*, 6, for a back door. PORTA. SMITH, *Dict. Ant.*, s. v. Janua. A false door at the back of a building. 6.

PTERIS. The Greek name for the FERN or bracken (Lat. *Filix*) largely used in decoration.

PTEROCARPUS INDICUS; the Padouk.—One of the most valuable forest trees of Southern India, producing very fine timber. *P. marsupium* (peak salvo, yegasch, of Orissa; and peak saul, yengassee and yagasee, of Cuddapah) is another good timber tree. When wet it gives a yellow stain. It is heavier than teak and more difficult to work; it has been tried for sleepers at Madras; and has also proved better suited for weather boards, verandahs, etc., than any other local wood; BUILDING NEWS *Journal*, 1856, ii, 919. *P. santalinus*, red Saunders or ruby wood, is shipped from Calcutta in logs from 2 ins. to 10 ins. diam. It is very hard and heavy; supplies the red sandal wood for dyeing; and often used in turnery. Adenanthera pavonina, coral wood, is similar in nature and sometimes confounded with the red Saunders. 14. 71.

PTEROMA and PTEROMATA. The Gr. for "wings". The projecting lateral walls of the cella of a temple, and thence the spaces between the walls and the columns of the peristyles. STUART and REVETT, *Antiq. of Athens*, edit. by KINNARD, 1825, i, 76, describing the Stoa or Portico, found this the most appro-

priate term for the singular projecting walls terminated by pilasters as found at this edifice.

PTERON. The Greek term for a wing or flank colonnade to a temple. APTERAL. ALA. FALKENER, *Classical Museum*, 8vo., 1851, i, 177, uses the term in "a mausoleum surrounded by its pteron, and terminating in a pyramid, the whole enclosed by a peribolus".

PTEROSPERMUM INDICUM; Amboina, *kaya buka* or kiabooka wood, is imported from Singapore, from Ceram, New Guinea, Arru, and other of the Mollucca islands. The native name is supposed to be *scrioulcut*. It is a knotty excrescence or burr which forms on the stems of the Lingoa tree and was formerly much esteemed for cabinet work. It is sawn off in slabs from 2 ft. to 4 ft. long, 4 ins. to 24 ins. wide, and 2 ins. to 8 ins. thick; full of small curls and knots; and its colour ranges from orange to chesnut-brown, and sometimes to red-brown. HOLTZAPFFEL, *Woods*, 8vo., 1843, p. 89. 71.

The houses at Colombo, Ceylon, are in general of *kabook*, washed with chunam; some are of two stories. 50.

PTOLEMAIS, formerly ACCO; now ACRE, or S. Jean d'Acre.

PUBLIC BUILDING. *Application of the Principles of Design*, in LOUDON, *Country Residences*, 4to., London, 1806, i, 119-23. The term is explained in clause 3 of the Metropolitan Buildings' Act 1855.

PUBLIC HEALTH ACT 1875, 38 and 39 Victoriæ, cap. 55, passed 11 Aug. 1875, now governs all matters relating thereto throughout England, except the Metropolis. By this statute all previous legislation was repealed, and the Sanitary law, with provisions for local government, consolidated. By sect. 157 urban authorities are authorised to make by-laws respecting new streets, buildings, open spaces, ventilation, drainage, sewerage, etc. The Local Government Board have prepared a series of model by-laws, under the head of *Suggestions*, etc., which, when generally adopted, will introduce an uniform system throughout the country, and so far as they extend are an excellent standard for reference. LUMLEY, *Public Health Act* 1875, 8vo., 1876. GLEN, *Public Health Act* 1875, 8vo., 1878. LOCAL GOVERNMENT ACT; and the Sanitary act 1866. A. C.

PUBLIC ROOM; see HALL; READING ROOM; MANCHESTER. The oldest example in England of a chamber for public meeting with its original arrangements preserved, is considered to be the remains discovered 1859 in the old tower of Barnack church, Northamptonshire, being of Saxon date; the tower arch is of very large size. BUILDER *Journal*, 1859, xvii, 848a.

PUBLIC WALK; see PROMENADE.

PUCHSBAUM (HANS). See BUCHSBAUM; the busts mentioned therein are also stated to represent PILGRAM; also a long article in NAGLER. He also designed 1443 the tower of the parish church at Steyer; and the pillar at Wienerburg, Lower Wienerwald. 68.

PUDDINGSTONE. "An aggregate of oblong and rounded pebbles of flint, about the size of almonds, usually black, and imbedded in a hard siliceous cement of a light yellowish-brown. It receives a very high polish, and was formerly much used in inlaying and other ornamental works. It is chiefly found in the county of Essex"; it was extensively applied to building purposes in XIII cent. on account of its durable nature; REES, *Encyc.* At Little Burghstead church, Essex, this stone was used in blocks like masonry; BUCKLER, *Churches*, 8vo., London, 1856, p. 182. Pudding stones and the breccias are very similar, but the latter have angular fragments.

PUDDLE and PUDDLING. (Fr. *corroi*, puddling or puddled clay; Fr. *corroyer*, to puddle), Clay tempered and rendered impervious to water, by working, chopping, and kneading, by means of a special tool and by a spade, until a perfectly homogeneous mass is formed. It is used in making ponds, reservoirs, embankments, and cofferdams, watertight; and is laid over the backs of walls and arches to keep water from penetrating. It is formed in layers from 6 ins. to 12 ins. thick. Sometimes a little sand or fine gravel is used to render it less liable to crack in dry weather; but it should be free from large stones, or any vegetable matter likely to decay. BUILDER *Journal*, 1862, xx, 300. Brindley invented a method of making dams without clay, using for this purpose any sort of earth duly tempered with water; MASON, *Works*, edit. 1811, i, 408. Clay tempered, close trod, and rammed down, as on a vault, weighs 112 lbs. per cubic foot; LANGLEY, *London Prices*, 1750, index. VITRUVIUS uses LUTUM for a sort of puddling.

PUDDLING OF IRON. This process (IRON, p. 46) consists essentially in stirring about pig iron molten on the bed of a reverberatory furnace, heated by flame, until it becomes converted into malleable (or wrought) iron, through the decarburizing action of the oxygen of the air circulating through such a furnace. Thus all contact between the metal and solid fuel is avoided, and the necessity of blowing machinery is dispensed with. This invention is usually ascribed to Henry Cort, by whom it was patented in 1784; (p. 627). The detail of the process is described by PERCY, *Metallurgy*, 8vo., London, 1864, ii, 654-799. It is taken out in "balls" weighing about eighty pounds each, and beaten into a "bloom"; then repeated and taken to the rolling mills to be flattened into sheets, or drawn out into bars. The process, in making steel, is done away with under Bessemer's patents.

PUDLAIES. A term explained in MOXON, *House Carpentry*, 8vo., London, 1694, p. 166, as "pieces of stuff to do the office of handspikes". STUART, *Dict. of Arch.*, s. v. Handspike.

PUE; see PEW.

PUEBLA DE LOS ANGELES (LA), or ANGELOPOLI, or LA PUEBLA. A city founded 1533 of Mexico nearly as large as the capital itself. The cathedral dedicated to Nostra Signora di Guadalupa, has a very large and rich altar. F. Becerra or Bacerra was, 24 Jan. 1575, appointed *maestro mayor* to the proposed cathedral; he removed 1581 to Lima. Of some 72 religious edifices there are about 60 churches, of which about 43 are large, as S. Spirito, S. Felippo Neri, S. Monica, the monasteries of S. Agostino, and S. Domenico (F. BECERRA), with above 100 towers. BULLOCK, *Mexico*, 8vo., London, 1825, i, 79-109, states that the 60 churches, etc., then surpassed in decorations, the quantity and value of the altar ornaments, and the richness of the vestments, the churches of Milan, Genoa, and Rome. The tomb by Léon Dupré to general Vernhet de Laumière, who died, 1863, at Puebla, is given in DALY, *Revue Générale*, 1872, xxix, 146, pl. 31. CHOLULA is about 6 miles distant. 50. 66. 96.

PUGET (PIERRE), Pujet, Pouget, and Poughet; DE PILES, *Art of Painting*, 8vo., London (1754), 3rd edit., app. 139, calls him Peter Paul Pughet, born 1623, died 1695. He was born 31 Oct. 1622, at Séon, near Marseille, where his father was in practice. He worked under a carver and ship-builder, and then studied at Florence; about 1640 at Rome became the pupil of P. da Cortona, assisting him in painting the palazzi Pitti and Barberini. Returning to Marseille 1643-4 he designed a ship of great magnificence for Anne of Austria, widow of Louis XIII, who, desirous of having drawings of the antiquities at Rome, Puget accompanied her agent to that city and remained there for five or six years; the existence of this collection is now unknown. He returned to Toulon, where, about 1655-57, besides painting many pictures, he designed and carved at the hôtel de ville, the doorway with termini and balcony; and the staircase and the arms of France to the hôtel at Marseille. Being sent by Fouquet about 1660 to Genoa to select marble for his works, he remained there executing works in architecture and sculpture; being recalled by Colbert he was awarded a pension of 1,200 crowns. At Marseille he restored 1668 the opera house; at Toulon 1672 erected a house for himself at the corner of the rue de Bourbon and rue de hôtel de ville; at Marseille designed 1672-74 the fish and meat market; the richly decorated façades of the rue du Cour, and designed those for the rues d'Aix and de Rome, at one corner of which last he built a house for himself (DE QUINCY); 1675 the façade to the church (1663) des Chartreux (interior by Dom. Berger); and 1679 (1789-94 in DE

Quincy) the chapel of the hospice de la Charité (at Aix or Marseille), nearly completed by his son; with at Aix, the hôtel d'Aiguilles. About 1683-5 he carved the Milo, and the group of Perseus and Andromeda at Versailles; an Alexander; and the bas reliefs of the Milanese plague, his last work and kept by his son: hence he has been styled the Michel Angelo of France, for his ability in all the three arts. Ralph, first duke of Montagu, sent him to London to design Montagu house, Bloomsbury (the edifice erected by R. Hooke having been burnt 19 Jan. 1685-6); it was embellished by Lafosse, Monoyer, and Rousseau. Sold for £10,000 to the English government, the site is now utilised for the British Museum, established there in 1753. He returned before 1692 to Marseille, built himself a small country residence and died therein, Dec. 2, 1694, aged 72. A statue of Puget by J. M. Ramus was erected 1855 in front of the exchange at Marseille, and a fontaine Puget with a bust, 1848.

The following memoirs much vary in details: Bougerel, *Lettre sur P. P.*, 8vo., Paris, 1752. Féraud, Dumersan, Duchesne, and Rabbe, each printed an *Eloge hist. de P. P.*, 8vo., Paris, 1807. Tournefort, *Voyage into the Levant*, 8vo., London, 1741, i, 9-13, who also visited the son at Marseille in March 1700. Ackermann, *Repository of Arts*, 8vo., 1811, vi, 165. Pons, *Essai sur la Vie et les Ouvrages de P. P.*, 8vo., Paris, 1812. Lance, *Dict. Biog.*, 1872. 3. 5. 14. 25.

Montagu house is referred to in Walpole, *Anecdotes*, iii, 170; or edit. 1862, ii, 559. Campbell, *Vitruvius Britannicus*, fol., London, 1767, i, pl. 34-6. Papworth, *Select Views of London*, 4to., 1816, from Ackermann, *Repository, etc.*, 1813, x, 332. Wilkinson, *Londina Illustrata*, 4to., 1819-25. Britton and Pugin, *Public Buildings, etc.*, 8vo., London, 1825, i, 55-60, gives views and a history. Ellis, *Original Letters*, 8vo., London, 1827, 2nd ser., iv, 89. Cunningham, *Handbook*, 1850, p. 342.

Jal, *Dict. Crit. de Biog.*, 8vo., Paris, 1867, p. 1011, quotes the biographies by Henry of Toulon, by Montaiglon, by P. Magry, and by F. Villot, of François Puget.

PUGGING. (Fr. *aire*). A composition placed between the joists of a floor to absorb or deaden sound, as well as to check the rapid progress of fire. The use appears to have been first suggested by lord Mahon (afterwards Stanhope), of lime and hair, or chopped straw as less liable to crack, passing over it a liquid composition producing an air-tight mass and protecting the wood from the direct action of flame; as read at the Royal Society, Phil. Trans., 1778, p. 884. It was referred to by Elmes, *Lectures*, 8vo., London, 1821, p. 270, as "called by workmen 'pugging' and 'sound boarding'". Pugging of the commonest sort to a single framed floor, is formed by a fillet nailed to each joist about halfway up, on which is placed "rough" or "sound" boarding, to carry a thick layer of plasterer's coarse stuff (lime and hair), chopped hay, sawdust, or cockle shells, all of which should be dry before the boards are laid, or of lath and plastering, forming a kind of counterceiling. Thin slate, and tiles have also been used for sound boarding. This invention has not always been successful in regard of sound; and strips of thick felt nailed on to the joists, is also unequal of success; Building News *Journal*, 1871, xx, 57.

PUGIN (Augustus Charles) or "C. A. P.", as on a plate dated 1806; born 1762 (or 1769 according to Lance, *Dict. Biog.*) in France, came to London about 1798, and was engaged as draughtsman and colourist in the office of John Nash. He early established a school of architectural drawing and colouring; and amongst his many pupils were G. B. Moore, Talbot Bury, Benj. Ferrey, C. J. Mathews, Lake Price, F. Arundale, Joseph Nash, R. Grantham, C.E., J. Pennethorne, F. T. Dollman, J. D. Egville, J. Amos, F. Whitaker, T. Cramer, W. Shoubridge, and many others. Morgan and Pugin designed "the Diorama" in the Regent's Park, opened Oct. 6, 1823, and described in Britton and Pugin, *Ill. of Public Buildings*, 8vo., 1825, i, 66-71.

Besides drawing and etching plates for numerous publications, chiefly the elaborate works then being issued by Ackermann, such as *Microcosm of London*, 1808, he published with Mackenzie, *Specimens of Gothic Architecture from Oxford*, 4to., 61 pl., n.d.: with E. W. Brayley, *A Series of Views in Islington and Pentonville*, 4to., 1823; in his own name, *Specimens of Gothic Architecture, etc.*, 2 vols., 4to., 1821-23, with descriptions by E. J. Willson; with J. Britton, *Illustrations of the Public Buildings of London*, 8vo., 1825-28; supplied plates of *Gothic Furniture*, 1810, 1825-26-27, to Ackermann, *Repository of Arts, etc.*, which were republished separately about 1835; with Britton and le Keux, *Specimens of the Arch. Antiq. of Normandy*, 4to., 1826-28; in his own name, *Examples of Gothic Architecture, etc.*, 2 vols., 4to., 1828-31; 2nd edit., 1838; a translation of Normand, *New Parallel of the Orders of Architecture*, with two extra plates, fol., 1829; with Heath, *Views in Paris and its Environs*, 4to., 1828-31; in his own name, *Gothic Ornaments from Ancient Buildings in England and France*, 4to., 1831; and *Ornamental Gables*, 4to., 1831, both lithographed by J. D. Harding. Pugin died Dec. 19, 1832, at No. 106, Great Russell Street, Bloomsbury. Ferrey, *Recollections*, 8vo., 1861; Dickens, *Life of C. J. Mathews*, 8vo., 1879, p. 39-41, etc. 14.

PUGIN (Augustus Welby Northmore), born 12 March 1812 in London, only son of the foregoing, commenced drawing, sketching, and measuring as early as 1826; and accompanied his father to Paris in 1827, assisting him in the work on that city. Studying the mediæval arts, he was first employed by many tradespeople to design furniture, plate, and decoration in that style. A list of the chief of his designs in architecture is given in Ferrey, *Recollections of A. W. Pugin and his father*, 8vo., London, 1861 (p. 274-6). Amongst his finest buildings are the chancel at Winick; his model church at Wymeswold (engraved); the cathedral church of S. George, Southwark; church of S. Barnabas, Nottingham; Cistercian abbey of S. Bernard, Leicestershire; with the cathedrals at Killarney and Enniscorthy; and Maynooth College, Ireland; with Cheadle, and Alton castle, near Alton towers, for lord Shrewsbury. The Mediæval Court in the Exhibition of Industry of All Nations 1851 was arranged by him, and contained a large number of his designs for art decoration, etc.

He published *Gothic Furniture, xv cent.*, 27 pl., 4to., 1835; *Contrasts*, 4to., 1836 (2nd edit. 1841); *Details of Ancient Timber Houses*, 4to., 1836; *Designs for Gold and Silversmiths*, 4to., 1836; *Designs for Iron and Brass Work, xv and xvi cent.*, 4to., 1836; *True Principles, etc.*, 4to., 1841; *Apology for the Revival of Christian Architecture in England*, 4to., 1843; *Glossary of Ecclesiastical Ornament*, 4to., 1844 (2nd edit. 1846); *Floriated Ornament*, 8vo., 1849; *Treatise on Chancel Screens, etc.*, 4to., 1851; and several pamphlets. Two volumes of 500 of his *Sketches* were photographed by S. Ayling, and published 8vo., 1865. He died Sept. 13-14, 1852, aged 40, and was buried in his church of S. Augustine attached to his residence at Ramsgate. The "Pugin travelling studentship" was originated as a memorial, 7 March 1864. Daly, *Revue Générale*, xi, 38-42, from Builder *Journal*, 1852. *Memoir* in Ecclesiologist *Journal*, 1852, xiii, 353, from *Morning Chronicle* paper; and *Artistic Merits*, ii, 10. *On the Life, etc.*, a lecture by Kerr, in Builder *Journal*, 1862, xx, 345. 14.

PUGIN (Edward Welby), born 11 March 1834, the eldest of the eight children of A. W. N. Pugin, succeeded to his father's practice at the age of 17 years. Ashlin was a pupil and partner for many years; as was also James Murray (died 1863) for a short time. He designed 1859 the monumental church in honour of the definition of the Immaculate Conception of the Virgin, at Dadizeele, Belgium; and 1861, the château of the bishop of Bruges, at S. Michel lez Bruges, in xiv cent. style; and 1859 with J. Bethune of Gand, the large château for the baron van Caloon de Gourcy, at Lophem; S. Michael's priory, Belmont, Herefordshire; church of SS. Peter and Paul at Cork; Augustinian church, Dublin; Kingsdown parish church, Kent; R. C. churches at Kensington, Peckham, Stratford, Barton, Leeds, Skerness, and Stonebridge, 1863; B. J., xxi, 358, orphanages at Hellingly and Bletchingley, the restoration of the

palace at Mayfield, Sussex; the great church at Gorton; many others at Liverpool; the Carmelite church at Kensington; church for Sir H. de Trafford at Stretford, 1862, B. *J.*, xx, 252; church at Manchester, 1861, B. *J.*, xix, 240; additional monastic buildings at Ramsgate, 1860, B. *J.*, xviii, 208; the Granville hotel, etc., at S. Lawrence-on-Sea, near Ramsgate; and completed Scarisbrick hall, Lancashire, after his father's design.

The following other designs by Pugin are illustrated; 1860, new college of S. Cuthbert, and schools of S. Aloysius at Ushaw, near Durham, B. *J.*, xviii, 152; 1868, church of the English martyrs, Preston, B. N. *J.*, xv, 516; and 1874, Carlton Towers, Yorkshire, for lord Beaumont, B. N. *J.*, xxvi, 200. He published, *Who was the architect of the Houses of Parliament?* 8vo., 1867; *Notes on Dr. Barry's reply*, 8vo., 1868; and *The Designs for the New Palace of Justice critically considered*, 8vo., Ramsgate, 1868. Pugin died 4 June, 1875, aged 41, and was buried at Ramsgate. BUILDER *Journal*, xxxiii, 523, (586); and BUILDING NEWS *Journal*, xxviii, 670, (706), both of which contain a lengthy list of the numerous works executed by Pugin.

PUGLIA (.....), designed 1809 the teatro Bellini, the largest one in Palermo.

PUGMILL. A machine used in brickmaking. It is in the form of a cylinder, sometimes conical, generally worked in a vertical position, with the large end up. Down the centre of this is a strong revolving vertical shaft, on which are hung horizontal knives following each other at an angle so as to form a series of coils round this shaft. The bottom knives are larger, and vary in form, to throw off the clay, in some mills vertically, in others horizontally. These knives are to cut the clay, and so work and mix it, that on its escape it may be one homogenous mass, without any lumps. WASH MILL. ROLLING MILL. BUILDER *Journal*, 1856, xiv, 443; BUILDING NEWS *Journal*, 1874, xxvii, 333. WEDEKE and ROMBERG, *Baumaterialienlehre*, 4to., 1846. Its position in relation to the moulder's workshop or *stool*, is shown in the woodcut, s. v. BRICK, p. 139.

G. de Boffrand, died 1754, is stated to have been the first to use this implement at Paris for mixing mortar. MORTAR MILL.

PUINTELL (WILLIAM), is noticed in WALPOLE, *Anecdotes*, edit. 1862, i, 2, as "Anno 1210 W. P. redd. comp. de £1216 13s. 6d., quos recepit de thesauro ad operationes turris Londoniæ".

PUKKA WORK. The Indian term for brick and lime work.

PULASTIPURA; see POLLANARRUA, in Ceylon.

PULFORD'S MAGNETIC PAINT, used (1865) for out-door work of timber and iron. In 1868 the war department issued the authority for its use in preference to ANTICORROSION PAINT for all iron ordnance, etc., as are coloured black.

PULHAM'S PORTLAND STONE CEMENT. Made about 1821, and the predecessor of PORTLAND CEMENT. BUILDER *Journal*, 1845, iii, 160, states it had stood perfectly the test of twenty-five years.

PULINCKX (HENRY), born 1698; designed 1736-39, the chapel of the convent of English Canonesses Regular of S. Augustine; and 1768 rebuilt the Jesuit college at the corner of the quai du Miroir, since 1836 an asylum for deaf mutes, both at Bruges. He died in 1781. WEALE, *Handbook to Belgium*, 8vo., London, 1859.

PULL-BACK. The iron hook on the hinge side of a casement to pull it into the groove formed in the wood or stone frame. 4.

PULLEY (Lat. *trochlea*; It. *girella*; Sp. *polea*; Fr. *poulie*; Ger. *wirbel*). One of the six mechanical powers. The common pulley is a wheel, rundle, sheave, or shiver, of wood or metal, in which is a groove holding the rope. The wheel turns on an axis or gudgeon bearing on a frame or case called a block, which prevents the rope slipping off. The pulley and its block are either fixed, or rise and fall, with the weight. An assemblage of several pullies is called a system of pullies, a *muffle* or polyspaston, of which some are in a case or block (Fr. *caliorne*), and is fixed; and others in a block which is movable, and rises or falls with the weight. The usual pulley blocks range from the "snatch" block, the wheel, wheel in case, to 2, 3, and 4 wheels in case. White's patent pulley was invented 1823, to provide against the inconveniences of friction, etc., it is figured in MECHANICS' MAGAZINE, 1823, p. 24-5; of two pullies, one is fixed, and each has six concentric grooves for the rope. Another improvement is "Weston's differential pulley block", 1862, which possesses the quality of not "running down" with the load; it is figured in THE LITERARY GAZETTE, 5 Sept. 1862. Hardcastles patented an improvement upon it, so that it can be used at either quick or slow speeds. Saunders' single or double purchase crabs have improved safety breaks. BUCHANAN, *Millwork*, 8vo. and fol., 1841, p. 297; Supp., 1842. GREGORY, *Mathematics for Practical Men*, 8vo., 1862 edit., by Law and Young. 13. 14.

The simple wheel pulley to a well from the S.W., or most ancient, palace, is shown in a woodcut by LAYARD, *Nineveh*, 8vo., 1849, ii, 32; and an Egyptian one, in the museum at Leyden, in note, ii, 317; it is of *athul* or tamarisk wood, and of fir.

A SASH PULLEY, or frame pulley, is a metal wheel, over which wheel the sash-line passes to raise or lower a sash. There are two kinds: 1. *Axle* pulley, where the wheel is mounted on an iron axle; the holes in the side plates in which the axle revolves are bushed with iron, steel, or brass. 2. *Frame* pulley, which should only be used for very light and common work; the wheel revolves on a small iron pin which is riveted at each side to the side plates, and is not bushed. MacAdam's pullies of a vitreous material; BUILDER *Journal*, 1863, xxi, 311.

PULLEY MORTISE or CHASE MORTISE. A long chase or groove cut in one side of a pair of parallel timbers, for the insertion of a small transverse piece, one end of which is let into the one timber, and the other end drawn up straight and tight in the chase. It is shown at F in the woodcuts, s. v. Binding beam, and Binding joist. 1. 14.

PULLEY STILE. That part of a sash frame up which the sashes slide, as G in the woodcut, s. v. Inside bead. 1.

PULLISH. An old way of writing POLISH.

PULPIT. (Lat. *pulpitum*; It. *pergamo*; Sp. *pulpito*; Fr. *chaire*; *pupitre* is reading desk; Ger. *kanzel*). An elevated place, an enclosed stage, or a platform, in a church for a preacher. The article AMBO describes the early pulpit; as that of MIMBAR, the Mahommedan pulpit. EAGLE DESK. LECTERN.

1548-49. 2 Edward VI. "Makyng of the Pulpitt xs.", S. Benedict Church, Norwich; TYMMS, *East Anglian*, iv, 37.

1689. "Paynting and guilding the sounding board and polpite, £3 : 0 : 0"; *idem.*—1577. "Payd to the Joyner for a cover over the pulpit, xxvis. viijd."; Bungay S. Mary; *idem*, iii, 198.

1491. "A convenyent pulpyte after the furme and makyng of that in the church of Moreton in Hemstead or better", for the church at Bodmin, Cornwall; BUILDING NEWS *Journal*, 1859, p. 556.

1547. Edward VI. Injunction. "A comely and honest pulpit to be set in a convenient place within the church"; pp. 45, 46, 50.

1559. 1 Eliz. No. 23, "provide a comely and honest pulpit", etc.; p. 89.

In the upper church dating from 1066 of the sacro Speco at Subiaco, is a pulpit of XI cent.; given in *Illustrations*, Pulpit, pl. 50, fig. 2. In the church of Sta. Maria at Toscanella, is a square pulpit, which probably dates 1206. The large pulpit in the cathedral at Amalfi has an inscription dated 1260 recording the workman's name, magister Nicolau de Bartolommeus Fogia. In Salerno cathedral are two fine and lofty pulpits, the small one dates from 1170. A similar one in the church of S. Giovanni del Toro at Ravello, is coarser in style. In S. Miniato near Florence, the pulpit dates from XI cent. The pulpit in the baptistery (S. Giovanni) at Pisa, was executed and finished 1260 by N. Pisano, who also did that in the duomo at Siena, begun 1266; *Illustrations*, pl. 94. G. Pisano executed 1298-1301, the pulpit in the church of S. Andrea at Pistoia; and 1302-11 the former one in Pisa cathedral destroyed, but partly used 1607 in the present pulpit. The *Illustrations*, Pulpit, pl. 50, fig. 1, give an example from the uppermost church of the Sacro Convento at Assisi, which is later than XI cent.; Fig. 3, from Messina, was by Antonio Gagini who died

PULPIT



S. BENEDETTO
SUBIACO



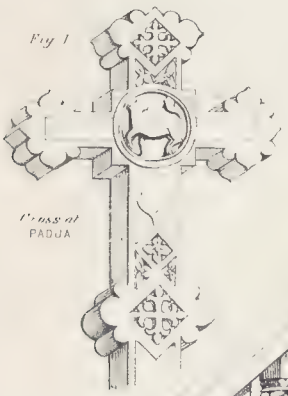
SAN FRANCESCO ASSISI.
Jacopo di Lapo 1228



CATHEDRAL MESSINA

PULPIT

Fig. 1



Cross at PADUA

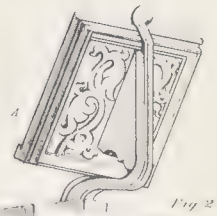


Fig. 2

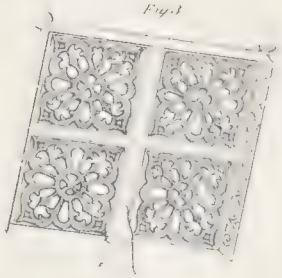
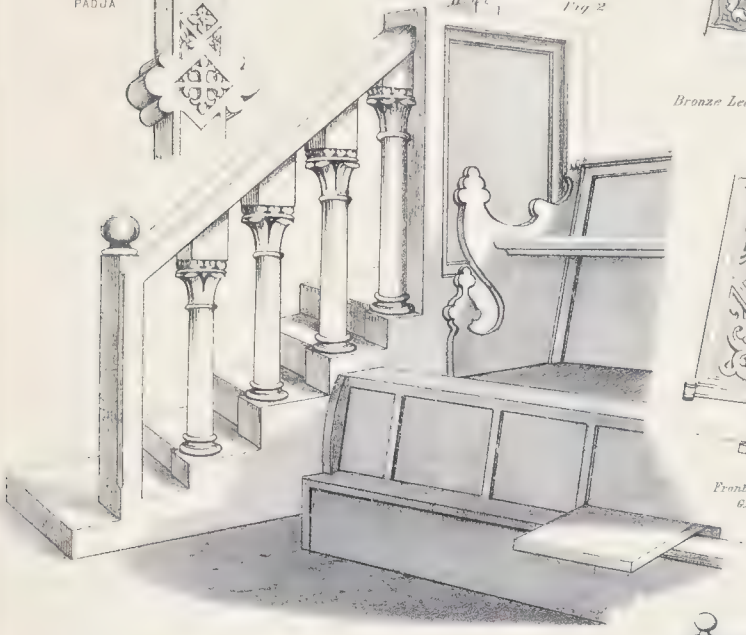


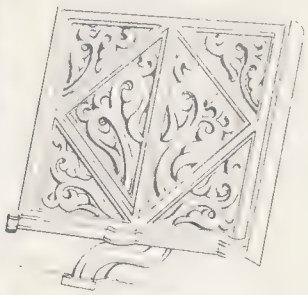
Fig. 3

Bronze Lectern in GIOTTOS CHAPEL PADUA



Ambo in GIOTTOS CHAPEL PADUA

Fig. 4

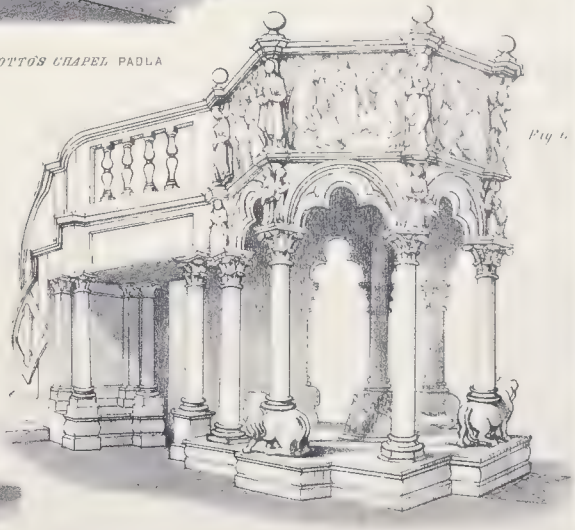


Front of the marble desk at A Fig 2 GIOTTOS CHAPEL PADUA

Fig. 5



Base of central column of Pulpit SIENNA



Pulpit in CATHEDRAL SIENNA

Fig. 6

M&N Hanhart Imp' P. C. Auld lith'.

17 Nov. 1571; it is said to have been destroyed 1860-61. LION. 14. 19.

In XII century (as at S. Augustine's Canterbury, and at Bury S. Edmund's, in England), pulpits were used in French churches, but probably they were only movable wooden lecterns. In XIII cent. they became usual owing to the establishments of the preaching friars, and their introduction into the refectory, as at Beaulieu, Chester, Shrewsbury, and Tintern. In XIV and XV cent. an open air pulpit was used in the cloisters or courtyard, as at S. Die, in France; at the friary at Hereford, and Magdalen college at Oxford. In churches they appear first in the Perpendicular period; WALCOTT, *Church, etc., Arrangement*, p. 56, read 1860, at Roy. Inst. of Brit. Architects. The earliest wooden example given in DOLLMAN, *Examples of Ancient Pulpits existing in England*, 4to., London, 1849, is dated 1400, and the earliest stone ones 1270 and 1320, the latest 1530. A list of 'Old stone pulpits in England' is given in BUILDER *Journal*, 1880, xxxix, 513. The Flemish carved pulpits of XVII cent. attract notice from their excessive costliness and extravagance of composition; they are chiefly of wood, and were built over rather than supported by, figures of saints, etc., of large size. WEALE, *Handbook to Belgium, etc.*, 8vo., London, 1859, describes twenty-six of them. WEBB, *Continental Ecclesiology*, 8vo., 1848, names many foreign pulpits: as do also the *Handbooks*.

A pulpit (PONS) stretching across a building in a manner similar to a roodloft, such as that which formerly existed in the church of Sta. Maria Novella at Florence, destroyed 22 Oct. 1565. PRONI. A pulpit to a Jubé, at Flavigny, France, late XV or early XVI cent., is given in GAILHABAUD, *L'Arch., etc.*; and in *Illustrations*, s. v. jubé and chancel screen. The roodloft *cir.* 1330 at Lincoln cathedral has a good staircase, and a unique "pulpitum" looking into the choir, which was preserved as far as possible when the organ was enlarged in 1824; PUGIN, *Specimens*, 4to., London, 1821-23, i, pl. 30.

A pulpit as a distinct building; see PREACHING CROSS.

The different positions for the pulpit in a church are noticed in BINGHAM, *Origines*, iii, 5; viii, 5; GUNN, *Inquiry*, 8vo., 1819, p. 216-23, and authorities cited. The pulpit on the south side of the nave, in DUCANGE, vi, 263; LENOIR, i, 98, 217; ii, 76; VIOLLET LE DUC, ii, 406-14. At north-east angle of nave; ECCLESIOLOGIST *Journal*, vi, 11; or north-west angle of chancel; *idem*, vi, 66. Pulpit to be in the nave; *idem*, iv, 212 A very large ambon or pulpit against south-east pier at Pavia cathedral. A pulpit of the XV cent. in S. Andrew's church, Brigstock, Northamptonshire, is said to be still in its original position; it is of lofty proportions. Sir C. Wren's account of the position of a pulpit in a building for hearing; *Parentalia*, fol., London, 1750. Comments on pulpits being in general too high, are given in BUILDING NEWS *Journal*, Oct. 1861, p. 835; 1871, May, 420. 1.

PULPITUM. The Roman term for the Greek proskenion or proscenium, or stage of a theatre. LOGEION. The pulpitum of the Isiac Curia at Pompeii, is of stone, with a pedestal in front and a flight of steps behind. 28.

PULSOMETER. A newly invented (1876?) steam pump without need of an engine, to be used for draining in place of centrifugal and chain pumps. BUILDER *Journal*, 1879, p. 312.

PULTAVA; see POLTAVA, in European Russia.

PULTUSK. An old town of Russian Poland, situated on the river Narew. A castle, three churches, and several old monasteries, comprise the chief buildings. 50.

PULVAN or PEULVAN; see MAENHIR.

PULVINAR. A Latin term for a kind of balcony. One was placed on the right hand side of the circus of Caracalla, or rather of Romulus, A.D. 311, at Rome, and there are the remains of another opposite.

PULVINATION. A swelling, as a pillow. BALTEUS of the Ionic volute. CUSHION or bolster work. PILLOW-WORK. The frieze in the Ionic, Corinthian, and Composite orders, have sometimes been rounded (Ger. *rundfries*); as at the baths of Diocletian at Rome, and at Aphrodisias.

PULVINUS ET GRADUS INFERIOR, were the seat and the step below, which together took up 2 ft. from the wall, out of 6 ft. between the wall and the pluteus, the curb or parapet, round a warm water bath, as described in VITRUVIUS, v, 10. 78

PUMICE. A kind of stone emitted with lava from volcanoes. Sponge stone or Pompeian pumice stone, is mentioned in VITRUVIUS, ii, 6. It is used by painters for rubbing down painted work before repainting; and in some metal work for polishing. It is also used for making a "gas fire". 13.

PUMP. A machine, worked by manual or steam power, for raising water or other liquid. All pumps may be classed under three heads; suction, forcing, and the compound suction or suction and lifting, pump. MARTIN, *Pumpwork, cir.* 1750. *Pompes Domestiques*, in DALY, *Revue Générale*, 1855, xiii, pl. 36-7; p. 210-41; 230-62; 289-308. *The Theory of Pumps*, in BUILDING NEWS *Journal*, 1868, xv, 288. AIREY, *The Spiral Pump applied as a Force, Suction, or Mercury, pump, with formulæ*, London, 1869. ELDRIDGE, *Plumber and Pump fitters' Guide*, 1874. HYDRAULIC RAM. SYPHON. PLUMBERY. PULSOMETER. 1. 13.

PUMP ROOM. (Ger. *trinkhalle*). The public room at a spa in which the patients take the waters, and promenade. One, 52 ft. in diam. and 54 ft. high with the dome, was designed and erected 1825-6 at the Montpellier spa, Cheltenham, by J. B. Papworth. The new pump-room at Baden, 1839, by H. Hübsch, in CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 137. GRANVILLE, *S. Petersburg*, 8vo., London, 1835, i, 92; *Spas of Germany*, 8vo., 1837; and *Spas of England*, 8vo., 1841.

PUNA; see POONAH in Hindostan.

PUNCH (Fr. *boucharde; chasse*). A tool for forcing a hole through a plate of metal; and for making an impression on a plate, as in metal work. "A prick punch was a piece of tempered steel having a round point at one end, to prick a round mark in cold iron", MOXON, *Mechanick Exercises*, 4to., London, 1693, p. 11, 29, 39-40.

PUNCHED WORK. Rough punched or fair punched is the same as scapled, skabled, shiffled, or nobbled, work of other stone districts. The first operation to a block of stone, afterwards BROACHED.

PUNCHEON, punchun, punchin (4), punchon (19), ponynchys, stancheon (MOXON), or stanchel (19). Fr. *poinçon*, as used by VIOLLET LE DUC, *Dict.*, s. v. Charpente, p. 3, for a small king post. "A short piece of timber placed under some considerable weight to support it;" MOXON, *Mechanick Exercises* (Carpentry), 4to., London, 1694, p. 166. "A piece of timber placed upright between posts, whose bearing is too great, serving together with them to sustain large weights." It is shorter and slighter than either a principal post or a prick post; and is called stud, quarter, and quartering. POST. 1397 and 1367, in SURTEES SOCIETY, *Finchale Priory*, 8vo., 1837, p. cxvii. WREN, *Parentalia*, fol., London, 1750, p. 336. 4. 19. 41.

PUNCHING MACHINE, is usually associated with plate cutting or shearing, and riveting. The operation of punching holes through a thick metal plate requires machinery of a very massive description, on account of the violent strains to which it is subjected. During the building of the Conway tubular bridge in 1848, punching machines were devised by Mr. Roberts, and have since been used for the Boyne viaduct, the Victoria bridge at Montreal, and the Jumna bridge in India; CIVIL ENGINEER, ETC., *Journal*, 1864, xxvii, 147. In the bridge over the river Thames for the Charing Cross railway, the holes were drilled not punched. This is a point upon which engineers differ considerably in opinion; but most firms punch the holes. SOCIETY OF ENGINEERS, *Transactions*, 1865. BUILDER *Journal*, 1862, xx, 756. May's patent, in CIVIL ENGINEER, ETC., *Journal*, 1846, ix, 386. ARTIZAN *Journal*, xvi, 85-6. BUCHANAN, *Millwork*, 8vo., 1841, pl. 48-52A. SAWYER, *On Shearing, Punching, Riveting, and Forging Machinery*, read at Inst. of Civil Engineers, 1858, xvii, 173. COLTHURST, *Experiments to determine the force necessary to punch holes through plates of Wrought Iron and Copper, idem*, 1841, p. 60.

PUNISHMENT. At Rome, near the circus of Sallust, is a place called *campus sceleratus*, where, according to DION HALICARNASSUS, the vestals who had violated their oath of perpetual chastity were buried alive; as further described in TAPPEN, *Observations*, 8vo., Lond., 1806, p. 176. A cell supposed to have been for punishing a nun, is given in CHURCH BUILDER *Journal*, 1876, p. 216-8. Amelia, daughter of William of Nassau, was buried standing in a niche; MAILLARD DE CHAMBURE, *Voy. Pitt. en Bourgogne*, i, 12. PENITENTIAL CELL. DUNGEON. PRISON. OUBLIETTE. 28.

PUNKAH. A large fan suspended from the ceiling or between the walls of an apartment in hot climates, in order to agitate and cool the air. It is worked by manual labour from the outside. A sketch of one in a church at Madras, in GOOD WORDS, *Journal*, 1869, p. 334. Lieut. Cook of Addiscombe in 1855 patented improvements in the method of working the "punka" in public rooms, as described in BUILDER *Journal*, 1855, xiii, 456

PUNNER. A long block of wood, or a rod of iron, having a heavy flat shaped end for ramming down earth, as at the back of a wall, for filling in. FISTUCA. The operation is called "punning". In loose, light soils, careful punning and grouting, and landings laid in mortar, can sometimes be used in place of piling.

PUPIL; see PRENTICE.

PURBECK MARBLE. A dark grey or pleasant green coloured limestone, almost entirely composed of freshwater univalve and bivalve shells of the genus Paludina, cemented together with an argillo-calcareous basis, or crystalline carbonate of lime. "In general, the stone may be said to be fine grained in the quarries north and west; while in those approaching the east, in the counties of Surrey and Sussex, the pattern is larger, the shells well defined, and scarcely any of them are broken; the marble from this latter district is consequently handsomer and is more generally in request for ornamental purposes." All varieties contain a large proportion of clay in their composition, which is one chief cause of their perishable nature. When placed bedways they have resisted the action of time satisfactorily, provided the earthy variety has not been used. There is also a certain amount of lamination, and decay takes place by exfoliation in small flakes; (SMITH). When used in long lengths, as in shafts, with the bed upright, the marble is very liable to split. It takes a fine polish. The quarries were stated in 1817 to have long since been worked out; up to 1851 men were not kept constantly at work at Woody-hyde near Corfe Castle, where the genuine material is to be obtained. The old quarry is said to have been reopened about 1840 purposely for the supply of the material for the new pillars in the round part of the Temple church in London.

Crackmore marble, from near Milborne, Dorsetshire, is said to be more effective than Purbeck; BUILDER *Journal*, xvi, 456. At or near Dunshay was formerly dug marble of this kind, supposed to have been used at Salisbury; HUTCHINS, *Hist. of Dorset*, fol., Lond., 1796-1815, i, 172, 2nd edit.

Purbeck and Petworth (or SUSSEX) and BETHERSDEN, marbles, appear to have been extensively used by English mediæval builders, as at Westminster Abbey, a large part of which is built of these two stones. They were used for columns, gravestones, pavements, and tombs, especially in the early part of XIII cent., chiefly in the southern counties, as at Salisbury, Llandaff, Exeter, Chichester, Winchester, though it is also found used at Lincoln, and in the ladychapel at Ely, 1321-49. DRAKE, *History of York*, fol., 1736, was the first to point out that this material "was brought from Pourbeck near Corf. Before that time it was supposed to be factitious, or brought from Caen"; BENTHAM, *Ely Cath.*, supp. by STEVENSON, 4to., 1817, p. 63; who notices the bad consequences of cutting the marble horizontally from the quarry, *History*, i, 39. LYTTLETON, *Account of Exeter Cath.*, publ. by the Society of Antiquaries. The innumerable small Purbeck pillars in Canterbury cathedral were restored with a composition made by G. Austin 1820-48. 1186-1200 vinegar is said to have been used in working the Purbeck marble columns; GENTLEMAN'S MAG., 1860, new series, ix, 463. 1204-5. The Patent Rolls, 6 John, give licences for the bishop of Chichester to convey his marble from Purbeck to Chichester, and for repairs of his church; and for the abbot and canons of Sori for their church; HARDY, 8vo., 1835, p. 70. Its use in 1207 at Chichester is noticed in WILLIS, *Chic. Cath.*, 4to., 1861, p. 3. 1239-40; 24 Henry III, a charge of £30 16s. 4d. for conveying a shipload of marble and four shiploads of Purbeck marble for the works at the Tower. *Cir.* 1350, "For 144 yards of marble stone bought to make columns for the chapel, at 6d. a foot with carriage and boatage from Corf to the king's bridge at Westminster, £10 14s. 6d.", for S. Stephen's chapel; SMITH, *Old Palace of Westm.*, 4to., London, 1807, p. 203. The altar in front of the jubé in the cathedral at Brunswick is said to be of this marble; GAILHABAUD, *L'Arch., etc.*, iv. 1. 14.

SMITH, at Royal Institute of British Architects, 30 May 1853. BRANNON, *Guide* to Swanage and the Isle of Purbeck, 1858, in BUILDER *Journal*, xvi, 639; and his *Guide*, 1860. HUNT, *Companion* to the 1862 Exhibition, 8vo., 328; 333. BUILDING NEWS *Journal*, 1875, xxix, 164; block from Lewin's quarry, West Butts, Poole, Dorsetshire. ARCHÆOLOGIA, i, 149; iv, 104.

PURBECK STONE, or Purbeck Portland stone. A name found in old writers given to stone now called Portland, and used for paving. The formation (formerly considered as Wealden, now as upper oolite) consists of various beds of oolitic stone ranging in colour from a light cream to a very dark grey, and sometimes a brown. The first bed of the Purbeck series comes immediately above the roach bed of the Portland series. The principal quarries are near Swanage in the isle of Purbeck. The upper bed, under the name of "Purbeck Portland", is used for troughs, sinks, and steps; and has been used at the lighthouses at Margate and in the Isle of Wight; the clock house on Dover pier; the prison at Winchester; the West India docks, London; the obelisk in Encombe park; and in numerous churches, bridges, etc., of the locality. It weighs 151 lbs. per cubic foot. The lower beds vary in colour, greyish and brown, and are used for ashlar, paving, curbs, and steps; but are now abandoned for the harder and more uniform Yorkshire stones. Another specimen weighed 162 lbs.; its specific gravity 2·6; its crushing resistence about 9,000 lbs. per square inch. BUILDER *Journal*, 1851, ix, 748: 1861, xix, 711-2: xviii, 133, 147. W. GRAY in DAMON, *Geology of Weymouth, etc.*, and *Supp.*, 8vo., 1860. 1.

CAMDEN, the historian, who died 1623, has minutely described the island of Portland without mentioning the stone quarries; in the next paragraph he describes the island of Purbeck, distant about 15 or 20 miles, as having "many sorts of good stone, from which large quantities are carried to London, to the great advantage of the inhabitants." In 1703 it was described "as almost like Sussex petties and used for pavement" (MITCHELL); and "Purbeck slab polished and used for chimney foot paces or hearths". A slab 12 ft. by 4 ft. is in Chichester cathedral, with others of an approaching size. 1712-16; "ailes of Deal church paved with Purbeck stone, £46:3:1", BOYS, *Sandwich*, 4to., Cant., 1792, p. 826. 1759; the greater part of the steeple of Hampstead church had to be pulled down, owing to the knavery of the mason in using Purbeck instead of Portland stone as contracted for in 1747; PARK, *Hampstead*, 8vo., London, 1818, p. 223.

PURCHASE. To arrive at the capital value of an estate, whether freehold, leasehold, or lifehold, at any given time, the nett annual produce has to be multiplied by the number of "years purchase". This multiplier is ascertained from a calculation of the present value of £1 per annum for the given number of years at the rate of interest to be obtained by the purchaser, and for this purpose the ordinary tables of Compound Interest are used. In these tables, the same rate is applied to the reinvestment to replace the capital as to the original investment, but as this can seldom be obtained allowance for this difference should be made; or in cases of importance, separate calculations. The "years purchase" depends upon the rate of interest

to be returned to the purchaser, as freehold land, 3 per cent.; freehold ground rents, 4 per cent.; freehold buildings, 5 per cent.; leaseholds, 5, 6, 7, or more per cent., according to the circumstances of each case. VALUATION. COMPENSATION. INTEREST, which gives a list of books of reference, and "table of the principals yielding equal amounts of interest", by A. Ashpitel. HURST, *Surveyor's Handbook*, p. 251. I'ANSON, *On the Valuation of House Property in London*, read at Royal Inst. of Brit. Architects, *Sessional Papers*, 2 Dec. 1872. MATHEWS, *The Valuation of Annuities and Reversions dependent upon Terms of certain Duration*, in INSTITUTION OF SURVEYORS, *Transactions*, 1870-71, iii, 55. A. C.

PURFLED WORK (Fr. *pourfiler*). The feathering attached to gablets, canopies, finials, etc.; W. WYRCESTRE, *Survey of Bristol*, 1480. Any delicately sculptured tracery. 19.

PURGATORY. A term used in Worcestershire for the grating and ash pan under a fireplace. J. J. C.

PURI, POOREE, and JAGANATHPOOR. A town of Orissa, in the presidency of Bengal, in Hindostan. It derives its importance from the Hindoo temple to Jugganath or Juggernauth (Jaganatha, "lord of the world") and was erected at an enormous expense by Anang Bhim Deo, to succeed the temple at Somnauth, being finished 1198. FERGUSSON, *Pict. Illust.*, fol., London, 1847, p. 25, pl. 2, with a woodcut of one of the ugly idols. BHOBANESER. "Jagan-nath temple is called Mandala Panji and Sri Krishna; the first name means the universal cyclar ii, or IE, or Jah"; ASIATIC RESEARCHES, xv, 268; 318. The main street, leading to the temple, consists entirely of religious structures, built of stone. Not far from the old temple is an immense fire tower now in ruins; see KANARAK. FORBES, *Oriental Memoirs*, 4to., London, 1813, iii, 5, gives a description of the ceremony of worship, etc., from BUCHANAN, *Memoir—Eccles. Establishment*, 4to., London, 1805. HAMILTON, *Description of Hindostan*, London, 1820, ii, 44-58: and *East India Gazetteer*, 1828. STIRLING, *Orissa proper*, (Calcutta, 1830) four views; ASIATIC RESEARCHES, xv, 191. DIXON, *Orissa, its Temples, etc.*, phot., fol., 1860. HUNTER, *Orissa, etc.*, 8vo., 1872. RAJENDRALALA MITRA, *Antiquities of Orissa*, fol., Indian Government. 14.

PURLIN or PURLINE (Lat. *templa*) and "PURLOIN or kerb of the roof", as in 6 George III, 1766, cap. 37; and "purloin or kerb thereof and gutter plates", as in 12 George III, 1772, cap. 73: called "side weaver" at York; and "pan" in Lancashire. (Fr. *panne* (5), and *tasseau*, carried by the principal rafter, Fr. *arbalestrier ou petite force*; and held in its place by a block, Fr. *chantignole*, under it, and by one above it, Fr. *bout de panne*; the *panne* carries the common rafter, Fr. *chevron*. It is the longitudinal timber in a roof, resting on the principal rafters, and carrying the common rafters. In a roof of large span there are two or more purlins between the pole plate and the ridge. Instead of rafters, boarding is often nailed diagonally, or straight across, the purlines. The purlin is usually fixed square, *i.e.*, at right angles, to the slope of the roof; some persons have argued that it should be fixed vertically, as is done in a few instances in some Gothic open timber roofs. The strains are shown in EMERSON, *Mechanics*, prop. ix. MEYER, in BUILDER *Journal*, 1859, xvii, 718. BUILDING NEWS *Journal*, 1874, xxvi, 27. PLANK ROOF. 1. 2.

In WREN, *Parentalia*, 1750, p. 336, occurs "purlines between the binding beams, not set right against one another, because of room to turn the screws whereby they are fastened", describing the roof of the theatre at Oxford. MOXON, *Carpentry*, 1694, p. 169, describes sleeper as the same as purlin. TREDGOLD, *Carpentry*, under "Rafters" gives a table of strength. By the Act for rebuilding the city of London, purlins from 15 ft. 6 ins. to 18 ft. 6 ins. in length, were to be 9 ins. by 8 ins.; from 18 ft. 6 ins. to 21 ft. 6 ins., to be 12 ins. by 9 ins. 4.

PURLIN BRACE, in mediæval roofs. "It is very rarely that purline braces are found elaborated, as they are at the Guesten Hall, Worcester, into a beautiful system of arcading and tracery; and although an approach to such a variety of ornament is found in works of XV cent., it is believed that this roof (late XIV cent.) is quite unique of its date, and therefore so much the more valuable"; it was restored *cir.* 1852 on paper, by G. E. STREET, as given in ASSOCIATED SOCIETIES, *Reports and Papers, etc.*, 1854, p. 147, etc. BRACE.

PURPLE; see GOLD PURPLE, used in stained glass.

PURPLE. The third and last of the secondary colours; mixed with others it forms tertiaries. PRIMARY COLOUR. The gorgeous purple colour seen in ancient MSS. is said to have been produced from madder. "The bones of S. Oswald were carefully washed and deposited in a shrine within the church, above which was hung his banner of purple and gold, betokening his twofold dignity as saint and king"; ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., 1876, p. 199. The deep purple (OSTRUM) which the Phœnicians extracted from a shell fish, murex and purpura, was restrained to the sacred person and palace of the emperor (A.D. 532). This purple had a strong smell, and a cast as deep as bull's blood; "obscuritas rubens nigredo sanguinea," CASSIODORUS, *Var.*, i, 2. GIBBON, *Decline* edit. 1854, iv, 311. Purple or PURPURISSUM was made from creta argentaria, a fine chalk or clay steeped in a purple dye (PLINY, xxxv, 12, 27). In colour it ranged between minium and blue, and included every degree in the scale of purple shades. The best sort came from Puteoli. VITRUVIUS, vii, 11 (13 and 14) however, states that blue was first manufactured at Alexandria, and afterwards by Vestorius at Puteoli. PURPURISSUM INDICUM (PLINY, xxxv, 26) was brought from India. It was a deep blue, probably the same as Indigo. PHILOS. TRANS., 1815. *Pompeii*, of Soc. for Diff. of Useful Knowl., 8vo., 1832, ii, 54-5; 58. 9. 13.

PURPLE BLACK. A preparation of madder, of a deep purple hue approaching to black; and is a durable pigment. 9.

PURPLE HEART, or PURPLE WOOD; copaiba or copaifera pubiflora or bracteata. A hard and ponderous though open-grained wood of British Guiana, obtained near the river Essequibo. The timber, of great strength, durability, and elasticity, is described by LINDLEY as "invaluable for resisting the shock of artillery discharges, on which account it is employed for mortar beds, also for windmill shafts, rollers, ramrods, and machinery". Possessing much beauty from the sort of puce colour of its wood, it is used for turning, and in buhl work and marquetry, being imported in pieces 8 to 12 ins. square, and 8 to 10 ft. long. KING WOOD is also called purple wood. A purple wood or Amaranthus; PAPISRANG of Penang. Purple wood, a product of Bahia, was 1846 to be imported duty free. HOLTZAPPFEL, *Woods*, 8vo., London, 1843. 71.

PURPLE LAKE. A preparation of cochineal; a rich and powerful but fugitive colour, inclined to crimson. Lac lake resembles it in colour, and is more durable. 9.

PURPLE MARBLE. "In the apse at Murano cathedral, the capitals of the two shafts in the angles are of deep purple marble, not carved—as are two others.—If carved they would have been injured by grey shadows being mixed with the surface hue, and so adulterated the purity of the colour.—The white capitals, which would otherwise have been devoid of interest, were carved:" RUSKIN, *Stones of Venice*, 8vo., London, 1867, ii, 38.

PURPLE OCHRE, or mineral purple. A dark ochre, obtained in the Forest of Dean in Gloucestershire. It is of a murrey or chocolate colour and forms cool tints of a purple hue, with white. Some natural red ochres burn to this colour, which have been employed under the denomination of *violet de mar*. Indian red has been classed among the purples. Burnt carmine makes a useful purple for water-colour painting. 9.

PURVEYOR OF THE WORKS. A title occasionally met with in old records, probably the same as PROVISOR, as named in 1365-6. In 1461, 1 Edward IV, William Hille held the "office of purveyour of all manere of Stuff to oure werkes bilongyng within oure paleys of Westm' and oure Towre of London and elles where within this oure reame of Englond, with fees, etc., as in oure lres patentes"; ROLLS OF PARLIAMENT, fol., London, 1767-77, v, 474. In 1484 it was held by Robert Mannynge;

Harl. MS., No. 433, p. 53; No. 574; and Brayley and Britton, *Palace, etc.*, 8vo., London, 1831, p. 337. He was the fourth officer of the king's works and had an allowance for a horse; Papworth, *Superintendents, etc.*, in Roy. Inst. of Brit. Architects, *Sessional Papers*, 1860, p. 47; and Dec. 1861, p. 40, he is named among the officers 1512-7 in the erection of Christ Church College, Oxford. At the building of S. Paul's cathedral, John Oliver was "assistant surveyor and purveyor"; Harl. MS., 4941: Builder *Journal*, 1858, xvi, 761.

PURUDKUL; Pattadkal of Burgess, *Researches in Dharwar*. The great temple, about viii or ix cent., is in plan almost a duplicate of the Kylas; Fergusson, *Indian Arch.*, 8vo., London, 1876, p. 338-9, who gives a plan.

PUTEAL. A curb to a well. It was generally round, and from 3 ft. to 4 ft. high. There is a round one of marble in the British Museum.

In the triangular forum and near to the temple to Hercules at Pompeii, is a small monopteral edifice with eight columns fluted, 16 ins. diam., of the Doric order, covering a puteal or welltop, from which the water required for the purposes of lustration during the sacrifices was drawn. Otherwise it has been called a bidental, or locus fulminatus, a spot where a thunderbolt has fallen; Gell, *Pompeiana*, vignette to the Preface. Another is in the temple to Isis. Another, which had been repaired and dedicated by Scribonius Libo (or Scribonis Licini, according to the *Scholiast* on Persius, iv, 49), and placed in the Roman forum, probably as an object of veneration. *A. A.

PUTEOLI. The Roman name of Pozzuolo, in Italy.

PUTEUS. The cold water receptacle in the frigidarium of a Roman bath. Pliny, Ep. v, 6. Smith, *Dict.*, p. 189*b*; 193*a*. 78.

To ventilate the portion of an aqueduct carried below the surface of the ground, a well, *puteus* of Vitruvius, was inserted at distances varying from 80 to 100 Roman feet, or 240 ft. according to Pliny, who calls them *lumina* or shafts, as figs. 5 and 6, in *Detached Essay*, Aqueduct, p. 7. Those wells seen by Pococke at Touma were fifty yards apart, the channel being 10 ft. underground. Spiramen or vent-tube. Prison.

PUTEUS (Andreas); see Pozzo (A.)

PUTHAN STYLE; see Pathan style.

PUTLOCK, now written putlog. (Fr. *boulin*; Ger. *rüstsange*); (putlog hole, Fr. *boulin*; Ger. *rüstloch*). Pieces of poles, about 7 ft. long, used in scaffolding, one of their ends bearing upon the wall, and the other upon the 'ledgers'. J. C. Bowles, proposed 1838-9 a kind of spring wedge for the end placed in the wall, as premiated by the Society of Arts, *Transactions*, 1839, lii, pt. 2, p. 231. 1. 4. 13.

PUTTOWAH; see Betwah, near Ahmedabad, in Hindostan.

PUTTUN, properly Pattanam. The Hindostan term for a town; as Shri Ranga Pattanam or Seringapatam, city of the divine Vishnu. The name given to Azimabad and corrupted by Europeans to Patna.

PUTTY. A sort of mortar used in setting rubbed and gauged brickwork to obtain a fine joint; see Lime putty. A "cold cement" (or mortar) and a "hot cement", for joining bricks in blocks for carved work, are described in Moxon, *Mechanick Exercises* (Bricklayer), 4to., London, 1700, p. 45.

PUTTY. A composition of whiting and linseed oil, well beaten up, used by the glazier for fixing in glass in frames, and by the painter for "stopping" holes; in both cases after the priming or first coat of paint is laid on. It is of four sorts, and usually dries hard; where large panes of glass cause constant expansion and contraction and the putty becomes loosened, a little common tallow (1 lb. to 14 lbs. of putty) is said to be mixed with it whereby it retains its pliability. Back putty. Glazing. Glass cement. A putty that adheres with great tenacity to most materials is described in Builder *Journal*, 1857, xv, 443: and a cement of mastic (or Bath stone dust) and boiled linseed oil for stopping in glass in freestone; *idem*, 1860, xviii, 64. Adulterated putty that never dries, is noticed in Builder *Journal*, 1862, xx, 230; and Building News *Journal*, 1869, xvii, 214. Rose's thermoplastic putty is advertised 1873 to become plastic by solar heat and to return to its original firmness on cooling.

Dry putty is easily removed after an hour, on painting it with nitric or muriatic acid: soft soap is said to be equally effective: or a paste of three parts of American potash with one part of unslacked lime laid on with a stick, and left for twenty-four hours. Lethicium is considered very efficacious, especially for cleaning off paint. 1. 14.

PUY, Le; and Le Puy en Velay (Lat. Anicium Villavorum). The capital of the department of Haute Loire, and in the province of Languedoc, in France; and situated on the river Borne; and is the see of a bishop. The cathedral dedicated to Nôtre Dame was built by Pison at end of x cent. Portions therefore date 980-1030; also in 1030-1100, 1100-1200, and some later works (Street, who observes that "the architect of this church and of that of S. Martin near Lyon must be the same"). Laborde, *Mons. de France*, fol., Paris, 1816, pl. 137-8. Three wood doors of the middle of xi cent. are to be seen in the cathedral, "Gaulfredus: me fcit: Petrus Epi." (as by Street, and dated 1043-53 by him); in the church of Chamalières; and the church of La voûte Chilhac, near Puy; De Caumont, *Abécédaire Relig.*, p. 149; and Street: the large second Pointed church of S. Laurent; the collegiate church; and on the summit 265 ft. high of the rocher or aiguille de S. Michel, is the church of S. Michel (Romanesque), 962 or 965-984, nave xi cent., steeple xii cent.; plan and views by Street, in Builder *Journal*, 1861, xix, 195-7: and the monument de Ste. Claire; Gailhabaud, *Mons.*, i. Among other buildings to be mentioned are the theatre, occupying an octagonal edifice usually called a temple to Diana; and by Didron, *Bulletin du Comité Hist.*, No. 7, p. 62, a mortuary chapel, like the chapel of S. Croix at Montmajeur; or, oratory of the Templars, by Mérimée, as at Metz, and at Laon (Street): 1825 the préfecture by—Macquet: Gourlier, etc., in *Choix d'édifices*, fol., Paris, 1825-50, ii, pl. 82-3: the large seminary; the bishop's modern palace; and the museum containing a quantity of Roman works. A colossal bronze statue of the Virgin on the rocher de Corneille. was designed by—Bonnassieux; it weighs 150 tons; is upwards of 50 ft. high; and consists of 120 pieces fastened together; a staircase is inside; Athenæum *Journal*, Oct. 28, 1860, p. 522. The town and the church are built of tufa, the quarries of which are open on Mount Anis; Brard *Mineralogie*, 8vo., Paris, 1821, ii, 53-4.

Nodier et Taylor, *Auvergne*, fol., Paris, 1829-33, ii, 56, give plates of old houses, of the cathedral, porch, baptistery, door, clock tower, cloister x or xi cent. (Romanesque); chapel of S. Claire; old town gateway; S. Michel rock and chapel; and many views in the locality. Mérimée, *Notes d'un voyage en Auvergne*, 8vo., Paris, 1838, p. 226. Street, *Churches of Le Puy en Velay, and of Auvergne*, read at Royal Institute of British Architects, *Sessional Papers*, 1860-61; and Builder *Journal*, 1861, xix, 18, 36. Mallay, *Eglises Romaines, etc., du Puy du Dome*, fol., Paris, 1840. Bouillet, *Statistique Mont.*, fol., Paris, 1842. Daly, *Revue Générale*, vi, 180; xiii, 235. Ramée, *Hist. Gén.*, 8vo., Paris, 1843, ii, 219. 14. 28. 50. 96.

PUZZLE GLASS. Glass moulded or cast with waves on one surface; Glass, p. 47.

PUZZUOLANA and Puzzolana; see Pozzuolano.

PYCNOSTYLE. An intercolumniation of one and a half diameters, as described in Vitruvius, iii, 2, who refers to "the temple of the god Julius, to that of Venus in the forum of Cæsar, and other similar buildings"; and states that "one-tenth part of the height of the column is the diameter" proper for it. It occurs in the ruins at Palmyra. 1. 2.

PYE-POLE, py-pole, and pie-pole; see By-pole.

PYLING; see Piling.

PYLON. (Gr. πυλών; Fr. *pylone*). The term first adopted by the editors of the *Description de l'Egypte*, fol., Paris, 1820, i, 294-8; and ii, for the mass on each side of the chief entrance to the court of an Egyptian temple. Wilkinson, *Handbook*, 1880, p. 75, states that the terms propylon, pylon, and pylône

are all properly applied to the gateway; but to prevent confusion he uses "pylon for the gateway and propyla for the towers", or propylæum. PORTAIL. Each is rectangular in plan, and in elevation resembles a truncated pyramid. Some have a staircase to the summit for access to the flag staves and other decorations; and some have chambers in them, as at Edfou; EDWARDS, *Up the Nile*, 8vo., 1877, ii, 594, who states that at Abou Simbel, the pylon is at the side instead of in front of the façade, on account of the very narrow space between the mountain and the river (ii, 512). Mariette bey discovered at Abydos the entire pylon of the north enceinte, which he considers the only complete specimen of architecture of the XII dynasty; DALY, *Revue Générale*, 1860, xviii, 120, 155. The innermost pylon at the great temple at Karnak leading to the sanctuary, is the last of the series of *seven* pylons; each one is smaller than its neighbour—thus from the first or outermost entrance to the end of the temple the pylons decrease in height progressively and symmetrically; MARIETTE, *Monuments of Upper Egypt*, 8vo., London, 1879, p. 173: decay of the western pylon, p. 180.

PYOTDYKES QUARRY, near Dundee, Forfarshire, supplies a sandstone of a purplish grey colour, composed of siliceous grains of moderate size with a calcareo-argillo-siliceous cement; and micaceous. It weighs 162 lbs. 8 oz. per cubic foot. The thickest bed is 3 to 4 ft. It was used in the works at Dundee harbour, etc. *Report* of the Commissioners on Stone, 1839. DUNDEE.

PYPPESHULL (ROBERT DE). In an account roll of 19 Edward II (1325-1326) he was the comptroller of the works at the king's chapel at Westminster and the king's chamber in the tower of London. In 2 Edward III (1328-29) he was appointed surveyor of the king's works at the palace, and tower of London, for life; *Rot. Orig.* Abbrev., ii, 23, roll 18; and 17 to 19 Edward III (1343-46) he held the office of controller of the works at S. Stephen's chapel in the palace at Westminster, and was succeeded by Martin de Ixning. BRAYLEY and BRITTON, *Ancient Palace*, 8vo., London, 1836, p. 148, 244, 426.

PYRAMID (Arab., *el haram*; Hiero., *mer* or *abmer*, a great tomb; *piraimus*). There does not exist in Egypt a single pyramid that is not the centre of a necropolis. What may be called the pyramid field of Egypt extends in a long series of groups, over about three parts of a degree of latitude, from Aboo Roash on the north, to Illahoon in the Fayoum, on the south. Brick pyramidal structures are also found at Thebes. In Ethiopia, near Napata (Meröe), there are also many similar structures. Each of the pyramids that served as the sepulchre of a king possessed an exterior temple which was built within a few yards of the eastern façade. Kaechos or Kakau, second king of II Thinite dynasty, is stated as the builder of the great stepped pyramid of Sakkarah (his tomb), now known by the name of Haram-el-Madarrggeh, which is not only the earliest extant pyramid, but the most ancient human architectural monument of known authorship on the whole face of the earth. This primitive work, whose configuration has much affinity with the terraced structure of the most characteristic of the monuments of Babylonia, namely, the Birs Nemrud, is remarkable for the extent and intricacy of its passages and chambers. It is now stated that Uenephes or Ouenephes, a king of the I dynasty, or "fourth king of Egypt", was the builder of it. The nucleus or remaining portion of the pyramid at Meydoum was perhaps built for Sephoris or Snefru, predecessor of Cheops; it is supposed to be the only pyramid not yet opened. The great pyramids of Geezeh (MEMPHIS) are the tombs of 1, Cheops (HERODOTUS), Suphis or Khufu; 2, Chephren or Shafra his brother; and 3, Mycerinus or Menkera (IV dynasty): the smaller ones are the tombs of members of the families of those kings. Eimai was probably the architect of the pyramid of Cheops, which was superintended by prince Merhet, whose tomb, on the west side of the pyramid was removed to Berlin, by LEPSIUS, as stated in *Discoveries*, 8vo., London, 1853, p. 39-40: Royal Inst. of Brit. Architects, *Sessional Papers*, 1859-60, p. 93. "Portrait of (Teta) the architect of the second pyramid, drawn by J. Bonomi from a tomb in the British Museum", Roy. Inst. of British Architects, *Report* for 1843, p. 20.

These two first-named pyramids at Geezeh were cased with the limestone of the country, the third with the red granite of Syene. The outer casing of the first has disappeared (except a few stones found on clearing the base) since the time of Amrou, *cir.* 674. The faces of all of the pyramids are set to the points of the compass; the one exception is that at Sakkarah whose side faces are 4°35′ east of north. The entrance was on the north side; to other tombs of the Memphite necropolis it faces east. It is curious that whilst the entrance to the pyramid at Memphis was only a late discovery, SERLIO, *Il terzo libro*, fol., Venice, 1644, p. 94; and 1663, p. 171, shows a small porch at the bottom and another about halfway up, as if to cover the ventilating shaft. LABYRINTH.

Under the ancient empire, the tombs of private persons were generally in the form of the *mastabah* (or mastabat), a sort of pyramid, truncated near the base, and which from a distance presents the appearance of an enormous sarcophagus lid. It consists of three parts: 1, one or more chambers, sometimes with a *serdab*, a sort of narrow passage concealed in the thickness of the masonry; 2, a vertical pit opening out of one of the chambers; and 3, a sepulchral chamber hollowed out in the rock, wherein the mummy reposes; MARIETTE, *Mons. of Upper Egypt*, 8vo., London, 1877, p. 95.

Pyramids in Greece; between Argos and Epidaurus, described by PAUSANIAS, ii, 25. MURE, *Greece*, ii, 195. SMITH, *Dict.*, s.v. Argos; BLOUET, *Morée*, ii, pl. 55.

At Rome; tomb to Caius Cestius. At Vienne.

In Etruria; 'Il mausoleo', on the Montarozzi, at Tarquinii, is circular (i, 351); grotta della Sedia, at Cervetri, 63 ft. by 56 ft. (ii, 59); that of Lars Porsena at Clusium, described by VARRO as quoted by PLINY, 300 ft. square and 50 ft. high, on which stood five pyramids each 75 ft. wide at its base and 150 ft. high; a labyrinth inside the square part. At Poggio Gajella near Chiusi; a vast sepulchre—a polyandrion—discovered 1839-40, recalling the above (ii, 385, etc.); DENNIS, *Etruria*, 8vo., 1848. CHIUSI.

Pyramids of Peru and Mexico; see TEOCALLI.

GREAVES, *Pyramidographia*, 12mo., London, 1646. MEISTER, *De Pyramidum Fabricâ*, 1774. FALCONERI, *Diss. de Pyramido*, in GREVIUS, *Thes. Ant.*, iv. GROBERT, *Descr. des P. de Ghizé*, 4to., 1801. GABB, *Finis Pyramidis*, etc., 8vo., Lond., 1805. FORBIN, *Voy. etc., P. de Ghizeh*, fol., 1810. J. DE VISMES, *Nouvelles Recherches sur l'Origine et la Destination des P. d'Egypte*, 8vo., Paris, 1812. BELZONI, *Narrative of Operations*, 8vo., 1822, CHAMPOLLION LE JEUNE, *Mons. de l'Égypte et de la Nubie*, 4 vols. 400 pl., fol., Paris, 1835-45. FERLINI, *Relation Historique*, 1838. FORCHHAMMER, *De Pyramidibus*, 1838. AGNEW, *On the Quadrature of the Circle in the Configuration of the Great P. of Ghizeh*, 4to., 1838. PERRING AND VYSE, *Operations, etc., at the P. of Ghizeh*, fol., London, 1839-42. PERIGAL, *On the Probable Mode of Constructing*, 1844. FIALIN DE PERSIGNY, *De la Destination et de l'Utilité permanente des P. d'Eg. et de Nubie*, 8vo., pl., Paris, 1845. LEPSIUS, *Bau der Pyramedeon*, 1845. LEPSIUS, *Denkmaeler aus Egypten*, etc., fol., Berlin, 1849-59. SHARPE, *History of Egypt, from earliest times to* A.D. 640, 8vo., 1859. FERGUSSON, *History of Architecture*, 1862-64. J. TAYLOR, *The Great Pyramid, why was it built? and who built it?* 8vo., London, 1864. DAY, *Plates and Notes relating to some special features in structures called Pyramids*, 15 pl., fol., Edinb., 1869. PIAZZI SMYTH, *Our Inheritance in the Great Pyramid*, 17 pl., 8vo., London, 1864; 1874; and 1877, 3rd edit. BONWICK, *P. Facts and Fancies*, 8vo., 1877. BRUGSCH BEY, *Egypt under the Pharaohs*, 8vo., 1879. PRISSE D'AVENNES, *Hist. de l'Art Egyptien*, fol., Paris, 1879. ROEBER, *On the Key to the Proportion of Cathedrals, Pyramids, and Egyptian Architecture*, Dresden, 1835-40. 1. 14. 25. 28.

PYRAMIDION. The apex or termination to an OBELISK. The obelisk at Heliopolis, the oldest in Egypt, bears the

cartouches of Usertasen or Osirtasen I, the second king of the XII dynasty. Formerly a funnel-shaped casing of copper descended about three cubits from the top, and covered its point, which existed in the time of Abd-el-Latyf, an Arab doctor of Bagdad who visited Egypt about 1190 A.D. The summit of the obelisk of Hatasou at Karnak, of XVIII dynasty, about 1660 B.C., was covered over with "pure gold taken from the chiefs of the nation", which may mean a casing of gilded copper, or it may refer to the sphere (of gold?) which is represented on certain bas-reliefs at Sakkarah; MARIETTE, *Mons. of Upper Egypt*, 8vo., London, 1877, p. 64-5; 171. "The apex of the obelisk at Heliopolis indicates, from its shape, the addition of some covering, probably of metal; and the form of that in the Fayoum, of the same king Osirtasen I, is equally singular—The apices of those at Luxor, as well as of the smaller obelisk at Karnak, which have a slight curve at each of their four edges, recede from the level of the faces, as if to leave room for overlaying them with a thin casing of bronze gilt"; WILKINSON, *Handbook*, 1880, p. 222. HITTORFF, *Précis sur la P. du bronze doré*, etc., 8vo., Paris, 1836. There are examples of pyramidions or apices in the Egyptian Gallery of the British Museum.

PYRAMIS. A word used by LELAND denoting the spire of Salisbury cathedral. 19.

PYRAN or PIRAN, SAINT; see PERRAN ZABULOE.

PYREUM. *Atechgar* or *Atechegah*, or fire altar. Two at Naktchi Roustam near Persepolis; BUCKINGHAM; *Mirror Journal*, xix, 1832, p. 297. ARCHITECT *Journal*, 1850, ii, 473. Also at Pasargada; FLANDIN ET COSTE, *Perse*, fol., Paris, 1844, text, ii, 393-4; pl. 180; 203. DUBOIS DE MONTPEREUX, *Voy. autour de Caucase*, etc., fol., Paris, 1839-43, iii, 89, 198, 243. TEXIER, *Asie Mineure*, fol., Paris, 1839-49, ii, 16. ALTAR.

PYRGI. A Pelasgic town of Etruria, now represented by the fortress of Santa Severa, six miles beyond Santa Marinella, near Civita Vecchia. Of the celebrated temple there are no traces existing. It was attacked B.C. 384 by Dionysius of Syracuse; became a Roman colony B.C. 191; a villa, v cent. A.D.; and A.D. 1068 was called Santa Severa. The foundations of the walls are of great thickness in parts; and there are no traces of towers in them. DENNIS, *Etruria*, 8vo., 1848, ii, 11-16; 272. 28.

PYRGOS. (Gr.). See CIBORIUM; ALTAR; and AMBO. 75.

PYRIMONT ASPHALTE mines and works in Savoy. A visit there, is printed in PRACTICAL MECHANIC'S *Journal*, and BUILDING NEWS *Journal*, 1869, xvii, 351. BITUMEN.

PYRIATERION. The Gr. term for the Rom. Laconicum in the Baths, from the fire of the hypocaust, which was extended under it; VOSS., *Lex Etym.*, s.v. ALEXANDER APHRODIS., ξηρὸν θολόν, a dry vaulted chamber. 78.

PYROLIGNEOUS ACID is obtained by distillation from woods, chiefly birch, and oak, and beech. The wood, heated in retorts, yields a very great variety of products, as crude acetic acid or pyroligneous acid, creasote, wood-tar, and charcoal. The acid, cooled as it passes off, collected at the other end. A retort which will contain 8 cwt. of wood, will yield 35 gallons of impure acid, which has a strong burnt or smoke-like smell. When rectified, it is sold as household vinegar, and for other purposes, such as preserving meat and imparting to it the smoky flavour obtained by drying in smoke. Its antiseptic properties were described in QUARTERLY *Journal*, 1820, xix, 175. From reliable experiments, railway sleepers treated with this acid endure three times longer than the same timber not so prepared: In the *New York Daily Advertiser*, 24 Dec., 1823, experiments with this acid were described; the acid recommended was the condensed smoke of wood. In coal tar is carbolic acid, which in many of its properties resembles creasote. BUILDING NEWS *Journal*, 1863, x, 417. CREASOTE. PRESERVATION OF TIMBER. OAK (p. 2).

PYROLIGNITE OF IRON. A crude solution of acetate of iron commonly so called; used in BETHELL'S process; and in BOUCHERIE'S process. DRY ROT. PRESERVATION.

PYROMETER, or heat gauge. A table is given, s.v. HEAT; and remarks s.v. FUSIBILITY with regard to Wedgwood's pyrometer. "Gauntlett's improved patent pyrometer" is 1868 extremely sensitive and durable, and registers to 2000° Fahr. "The recording pyrometer" with clockwork attachment writes down the temperature continuously on a sheet of paper. *On Damill's, Wedgwood's, and Wilson's Air Pyr.*, read at Institution of Mechanical Engineers, 1852; printed in CIVIL ENGINEER, *etc. Journal*, 1852, xv, 210. 14.

PYRO-PNEUMATIC STOVE. A pedestal stove, invented 1848 by W. Pierce, having an open fire with hot air chambers formed of fire-clay only. Air was admitted from the outside into a chamber between the fire-clay lumps and the casing, so that the air was not burnt as in iron stoves, and the open fire assists in carrying off the foul air of the room; CIVIL ENGINEER, ETC., *Journal*, 1849, xii, 95. Since then a number of variations have been made.

PYRRHUS. An architect of unknown age, who, with his sons Lakrates and Hermon, built the treasury of the Epidamnians at Olympia. PAUSANIAS, vi, 19. 117.

PYRUS, now comprises P. malus, Apples; P. communis, Pears; P. aria, Beam; P. domestica, Service; P. aucuparia, Mountain Ash (FRAXINUS); and Dwarf crabs. *Apple wood* is of light red-brown tints; the butt only is used: it is harder than sycamore, chestnut, and lime, and is close. *Pear wood* is light-brown in colour, approaching pale cedar wood. It is a very useful material for carvers (CARVING), as it cuts with nearly equal facility in all directions of the grain; it is harder and tougher than lime wood, and has fewer darker streaks. It was formerly used for the blocks in calico printing and paper-staining; by pastry cooks; and by the Tunbridge ware turners. The crab is used for the teeth of mortice wheels. HOLTZAPFFEL, *Woods*, 8vo., London, 1843. The mountain ash yields a fine-grained hard wood, capable of receiving a permanent stain and a high polish; and is suitable in most cases where pear tree wood is used. PENNY MAGAZINE, 1843, xii, 472. 14. 71.

The fruit of the apple and pear trees has been used in architectural sculpture, as in the festoons of the freize of the temple to Vesta at Tivoli; and apparently in those under the portico at the sides of the entrance to the Pantheon at Rome; TAYLOR AND CRESY, *Rome, etc.*, fol., 1821-2, pl. 50. PRUNUS.

PYTHEUS, phiteus, phyteus, phythius, pitheus, piti, pitius, pythis, and pythius; see PHILEUS of Ionia; and PHITEUS. VITRUVIUS, iv, 3; i, 1; vii, pref.; HERMOGENES and HALICARNASSUS. It is not clear whether these are or are not one person. GWILT, *Encyc*, pref. vii; and edit. 1867, pref. ix, states the opinion of "Pythius", that "an architect should have as accurate a knowledge of all the arts and sciences as is rarely acquired even by a professor devoted exclusively to one". 3. 5. 25. 59.

PYX, or pix. A box, tabernacle, or shrine; a depository for the host or consecrated wafer used in ceremonies in the Roman Catholic church. In more modern times it was raised on a foot like a MONSTRANCE. LEE, *Glossary*, 1876. WEALE, *Guide to Belgium*, 1859, s.v. ARCHÆOLOGIA, 1792, x, 133.

A pyx for the receipt of oblations is mentioned in the *Constitutions* of bishop Blois, 1229. There is a fixed stone pyx of this kind in Bridlington church, Yorkshire.

OBSERVATIONS
ON PEDIMENTS,
WITH
A GENERAL METHOD
FOR
DETERMINING THE PROPORTIONS OF THAT PART OF EDIFICES.

BY

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With Illustrations
(Plate 27)

Etudiez premièrement la science, et puis suivez la pratique.
C'est ainsi que fait de la science.—LEONARD DE VINCI

PARIS, 1824.

ON THE ORIGIN OF PEDIMENTS.

The generality of houses in Rome were covered by platforms; only the edifices consecrated to the gods were surmounted by raised roofs, and Cæsar was the first person allowed to raise a pointed roof to his dwelling similar to those of the temples.

It is not long since, that in France, a gable over the street was the indication of a considerable habitation, and it is possible, that from this distinction, which was affected in the form of the roofs, the extreme loftiness of the edifices called "Gothic", and thence the form of its pointed arches, may have resulted.

Whatever may be the degree of importance attached to this form of roof, the Greeks, among whom it was first employed,[1] were forced, in order to terminate the extreme ends of their buildings with dignity, to design the pediments, which crown so elegantly the temples of their gods (fig. 1, Plate 27); and it would not perhaps be unreasonable to suppose, that if the triglyphs of the Doric frieze, the first order in use amongst these people, had not demanded the return of the whole of the entablature, they would have left plain, or adorned only with bas-reliefs, the space between the architraves and the sloping cornices (fig. 2).

ON THE PARTS OF PEDIMENTS.

In a pediment there are three parts to be distinguished, namely, the tympanum A, the cornice B, and the acroteria C C (fig. 4), a species of pedestal without base, used by the Romans in particular, to receive statues.

ON THE HEIGHT OF PEDIMENTS.

From the small height which Vitruvius allows to the pediment, it is evident, that this author specially followed the Greek monuments, in determining the proportions of this part of buildings. The Roman Architects not only considerably deviated from his rules in this respect, but, forgetting the first intention of the pediment, employed it to decorate doors, windows, and interior niches (fig. 15), sometimes even changing the original triangular form into the segmental (as we see in the small altars of the Pantheon at Rome, fig. 21), or giving it a bizarre shape, as at Palmyra and Baalbec.

According to Vitruvius, the height of the tympanum (fig. 4) should be equal to the ninth part of the length of the corona, from one extremity of the cyma to the other;[2] but the successors of this Architect, finding such pediments too flattened in appearance, have laid down other rules, of which the least inconvenience is, that they all differ; thus, Scamozzi directs that the height of the pediment should be, to its apex, 2-9ths of its base; others, again, give but 1-6th to this height; others, 1-7th; at the present time, Architects seem to confine it between 1-4th and 1-5th (DURAND, *Leçons d'Arch.* vol. i, p. 81); Serlio, lastly, has taught a graphic method, which consists in dividing the length Q T, of the horizontal cornice or base of the pediment (fig. 12), into two equal parts, by a perpendicular line V X, making A X equal to A T, or A Q; and from the point X, as a centre, with a radius equal to Q X or T X, describing the arc Q Y T, which determines the point Y on the perpendicular V X, as the apex of the pediment.[3]

It appears to me, that none of the rules proposed, whether by Serlio, Scamozzi, or any other master, have an application sufficiently general to give them the preference over that laid down by Vitruvius (to which, however, they approach closely in edifices of small width); but if the methods of Serlio and Scamozzi differ but little from the principles by which the admirable proportions have been determined, both of the pediments which surmount the small bicolumnar altars in the Pantheon, and that of the octostyle portico of the same magnificent building; how, were we to follow the rules of these masters, should we determine the proportions of the pediment to a decastyle portico, such as we may presume to the temple of Apollo Didymæus, near Miletus, or, to an edifice which, like the frontispiece of Nero at Rome, would have had, according to Palladio, twelve columns in front?

In applying these rules to different porticos (fig. 23), we see that even in the decastyle, the height of the pediment with that of the entablature, would together exceed that of the columns, even if Corinthian, and that this excessive height would increase still more, progressively, and in manner perfectly inadmissible, in proportion to the greater number of columns.

Surely then, in these extreme cases, the rule of Vitruvius would be preferable to all the others, as we can see from the same figure (23), where the results are indicated in dotted lines; and these results, which are not without examples, would apply equally to the Pantheon of Hadrian at Athens, and to the temple of Apollo instanced above, both decastyle, and of which the tympana would have, the one rather less, the other rather more in height, than the ninth part of the length of the horizontal cornice.[4]

[1] The Corinthians were the first to cover their temples with ridged roofs. (*Blondel, Cours d'Arch.* P. 2, B. 7.)

[2] The cymatium of the corona must not be confounded with the great cyma, which, according to Vitruvius, should surmount only the cornices of pediments, and thus not be applied to horizontal cornices, except when they are lateral, or when they pertain to designs which have no frontispiece.

[3] We must not lose sight of the fact, that when the height of the pediment is mentioned, such height is taken, exclusive of the great cyma.

[4] The examples are taken from DURAND's *Parallèle des Edifices anciens et modernes.* It is from this work, also, that

If, also, we compare the rule of Vitruvius with the octostyle temples of the ancients, we shall see that the height of the tympana to those of Jupiter Tonans, Neptune, Jupiter Stator, the basilica of Antoninus, etc., would be at the utmost 2-15ths of the length of the horizontal cornice, a proportion differing but little from 2-18ths. Lastly, the less number of columns the façade possesses, the nearer does the rule of Vitruvius approximate to those of Serlio and Scamozzi, as can be seen from figures 4 and 22.

These rules appear to be all founded on the declivity which each of these authors has judged the most suitable to give to the slope, for the purpose of obtaining therefrom the prompt discharge of rain-water. Vitruvius is perhaps the only one, who, inhaling his principles under the pure skies of Greece, had possibly but little regard for this consideration, and has therefore fixed the height of the tympanum at the ninth part only, conformable to the noble examples he had before his eyes.[5] But in Italy, where the more continuous rains demand proportionably elevated roofs, it became necessary to abandon the Greek model adopted by Vitruvius, and in lieu thereof to follow the rule of Scamozzi, who apportions to the height of the pediment 2-9ths of its base; or that of Serlio, who allows rather less than the same result. Under the watery skies of our climate, we are compelled to increase this height still more, and some Architects, as Fontana, have not feared to raise it even to one-fourth.

Rules based on local considerations, may sometimes hold the position of principles; but it appears to me, that (without blaming modifications, which peculiar circumstances may authorize,) it is not the less useful to seek to fix these principles, and, when they are recognized, to establish their authority, by general rules.

Now the chief inconvenience attending the rules proposed after the time of Vitruvius, consists in the uniform inclination of the cornices of all the pediments, whatever may be the number of columns which they surmount; and this uniformity nowhere presenting itself in the works of the ancients, in which the cornices of the pediment are so much the less inclined to the horizon, in proportion as the façades contain a greater number of columns, it would appear that none of these modern masters in the art had sufficiently studied the question, and that, therefore, the general law from which to determine the proportions of pediments, remains still to be discovered.

Awaiting a more ample solution of this problem, I venture to offer the results of some researches in which I have been engaged, from the necessity of obtaining a method applicable to all cases.

METHOD FOR DETERMINING THE PROPORTIONS OF PEDIMENTS.

Let A (fig. 9) be a tetrastyle portico of the Ionic order, raised according to the proportions of Vignola, and $a\,b$ the total length of the horizontal cornice which forms the base of its pediment. If, from the points a and b, taken successively as centres, and with a radius equal to the total length $a\,b$ of the cornice, the arcs $a\,x$, $b\,x$, be described, the intersection of these arcs on the perpendicular, V X, will give at x a point, from which, as a centre, and with the same radius $a\,b$, may be described the arc, $a\,y\,b$, which, at y, will determine the height of the tympanum.

Above, and from this point y as a centre,[6] and with a radius $y\,g$, equal to the depth of the horizontal cornice,[7] describe a portion of a circle $f\,d\,g$; from the extremities of the horizontal cornice a and b, draw the tangents $a\,d$, $b\,d$, which will be the uppermost inclined line of the cornice of the pediment; it then only remains to add as many more lines parallel thereto as are necessary—those beneath, to express, in their relative positions, the members of the cornice—those above, to represent the great cyma.

If we determine in the same manner the height of the tympana, and the inclination of the cornices of the pediments, of the octostyle and dodecastyle porticos B and C (fig. 9), of which the length and depth of the horizontal cornices are given, it will result, that the successive heights of such pediments will diminish progressively, in proportion to the greater number of columns, and in accordance with a law which seems to meet the demands of the case; for not only does it avoid that want of elevation, in porticos of few columns, which constitutes the fault of the pediments of Vitruvius, but also, if we select examples, it agrees with the other rules.

Thus, in a porch of two Ionic columns, raised according to the proportions of Vignola's portico without pedestals (fig. 8),[8] the total height of the pediment under the great cyma is between one-fourth and one-fifth of the length of its base, a proportion adopted by modern Architects, and approaching very nearly to the 2-9ths of Scamozzi: in the tetrastyle A, this height does not differ sensibly from that obtained by Serlio's method;[9] on the

adopting, without discussion, the denominations therein given to the different monuments, comparisons are established, and proportion founded on the restorations.

[5] The portico of the Ionic temple near the Ilissus, according to Stuart, is an example; and if the tympanum of the portico of Athens has one-eighth in height, that of Minerva Polias, has but a sixteenth at most.

[6] Vitruvius, in prescribing the height of the tympanum, does not point out the method of determining the inclination of the slope of the pediment. Although it might be extremely simple and easy to comprehend, it would not have been altogether useless to have mentioned it. It must be the same as that which we here employ, indicated at fig. 4, by the portion of a dotted circle marked $c\,p\,v\,x\,q$ (and fig. 9, $f\,d\,g$).

[7] We know that the horizontal and sloping cornices of modern pediments are usually alike, and equal one to the other. This rule is not binding, the less so, inasmuch as it is contrary to principle, as we shall see hereafter; and as, in many cases, its application engenders serious difficulties.

[8] I have deemed it better to select the Ionic order of Vignola, as an example of the method I propose; first, because it seemed to me to be the purest and best proportioned of the five orders of this master, and, especially, because the projection of its cornice (without including the great cyma) and its depth, hold a medium place between the heights and projections of the cornices to the other orders; which is by no means unimportant for our purpose, as these proportions influence very perceptiby the data which serve as the base for our operations.

[9] It has been remarked, that the angle of the apex of pediments constructed after the method of Serlio, is equal to the angle $p\,q\,r$ in the circumference of an octagon, X (fig. 12), since, in fact, the point X being the centre of the arc Q V T, which has been described, the two radii, X Q and X T, form a right angle (Belidor).

In making an analogous remark on the elements of this new method, we might be tempted to believe that, having constructed the dodecagon X (fig. 9), the angle at the apex of all pediments would be equal to the angle $p\,q\,r$ of this polygon, which is not, however, the case, and could only be so, in fact, if the inclination of the cornices of these pediments were parallel to the sides of the dodecagon.

But it is not so, and it is in this very particular that the proposed method differs essentially from that of Serlio and all others invented since the days of Vitruvius; for, by means of the arc $g\,d\,f$ (of which the radius is equal to the height of the horizontal cornice, and the centre of which is on the arc $a\,y\,b$, at the point y, the apex of the tympanum), all parallelism to the side of the polygon X is avoided, in proportion as the base of the pediment is less in length; as we may convince ourselves by examining fig. 10, where we see at once that the nearer the radii $d\,a$, $d\,b$, etc., perpendicular to the tangents $a\,1$, $b\,2$, etc., incline to be parallel to the horizontal line L M, the nearer the tangents incline to be parallel to the vertical P N. This peculiarity of the new method gives it also the advantage over the others in this respect, that the longer the radius of the small circle $g\,d\,f$ (fig. 9), the more the slope of the pediment increases; which

other hand, in hexastyles, octostyles, etc., it ranges between a sixth and a seventh, proportions prescribed by some Architects, and supported by numerous ancient examples.

This, then, is the general method which I propose to adopt.

ON THE CORNICE OF PEDIMENTS.

In speaking of the origin of pediments, I have supposed that the necessity of retaining the triglyphs, which are the chief characteristic of the Doric order, may have prevented the suppression of the frieze and horizontal cornice of the façade of temples;[10] and to this motive we may add the difficulty which presented itself, in the return of the horizontal members of the cornice on the lateral faces, following the inclination of the pediment; for the return, as indicated at A, fig. 14,[11] could not be executed; and to make the lateral cornice in the manner in which it is shown at fig. 13, it would be necessary in some measure to make the art retrograde, a hazardous enterprise to undertake, since architecture, raising magnificent monuments, must have long since lost sight of the humble cabin whence she took her rise.[12] This difficulty of the return of the cornices, which disappeared by the retention of the horizontal one, reappeared later, when the great cyma was considered as an essential member in cornices,[13] and that of pediments only as its prolongation; but the curvature of this cyma rendering it less in length at its lower than at its upper part (fig. 6), this difficulty was surmounted by making the cyma of the pediment higher than that of the lateral cornices;[14] and when the pediment (through a novel abuse of proprieties) crowned only one portion of the façade, some modern Architects contrived a projection (fig. 7), which preserves the same thickness to both cymas; whilst others, to allow only the just proportion to the cyma of the pediment, have preferred to diminish the height of the lateral cymas (fig. 7). This method appearing the most reasonable, is the one I propose to adopt. The Greeks, seeing no affinity between the slopes and the eaves of their roofs, did not apparently attempt to constitute any between the cornices of the lateral faces which terminate the eaves, and those of the pediments which terminate the slopes. Hence the great simplicity of these last in almost all their monuments, and the constant suppression of the mutules in cornices of pediments to the Doric order, as in the portico of the temple of Theseus, and that of the Parthenon at Athens.

The Romans believed that these cornices should be alike; and in adopting particularly the modillions and dentils with which they enriched the cornices of their sumptuous edifices, took great care not to suppress them in cornices to pediments, as the fragment of the frontispiece of Nero evidences. Modern Architects have followed their example; and fig. 22 is a design for a pediment surmounting a tetrastyle Corinthian portico, according to the proportions of Vignola. Therein we see the modillions and

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settles the question; whatever may be the length of the bases, whatever may be the proportions of the cornices.

[10] BLONDEL, in treating on the defects of pediments, observes, that, in order not to swerve from the severity of nature, we ought to omit the horizontal cornice to façades where there are pediments; and elsewhere cites some examples of this kind, taken from ancient edifices, and particularly from the baths of Dioclétian. It is impossible to agree with Blondel, if we reflect that the ancients have never omitted to put the horizontal cornice to the frontispiece of temples. It might also be objected, that the rampant cornices which terminate the gables of the halls in the baths, basilicas, etc., are by no means pediments. The observation is at least open to discussion. It rests with professors to rectify, if necessary, the consequences of Blondel's opinion in this respect.

[11] With a little attention, we shall observe, that in this case the return of the soffits of each member would in itself form a species of molding, as is expressed at B in the same figure.

[12] The inclination of the soffits of the cornice exists in the coronas of most of the ancient Doric temples, as in the great temple at Pœstum (fig. 19); and is found at Rome, in the Doric entablature of the theatre of Marcellus (fig. 17). In the temple of Segeste (fig. 20) this inclination does not appear to differ from the mean slope of the pediment; to these particular observations, we may add some, made on the spot by Le Roy. This architect remarks, that, according to Vitruvius, "the mutule was imitated from the projection of the roof timbers," which is better proved by the fact, that the face of the mutule, from which depend the guttæ, is inclined in the temple of Theseus, in precisely the same degree as are the sides of the pediment. This temple was erected about ten years after the battle of Marathon, and apparently served as a model for the temples and most celebrated edifices which were constructed at Athens, some short time after, under the government of Pericles. This conclusion as to the origin of cornices, as so many other types, still remaining, of those of the different parts of the Greek entablature, causes a regret that, in our time, some Architects affect so decided a contempt for the wooden prototype; the more so, if we consider that it is ever for those monuments, which bear the greatest affinity with the unity of its whole, that we express the most unanimous admiration.

[13] There was no great cymatium to the side cornice of the temple of Minerva (fig. 16), nor was there any even to the cornice of the pediment of the temple of Theseus (LE ROY).

[14] Here particularly, it may be observed, how much during these latter ages, architecture has wandered from its principles; for, amongst the ancient Greeks, the horizontal cornices were only a simple corona with its mutules, the soffits of which, inclined comformably to their origin, threw off the rain-water far from the walls of the building (DURAND'S *Parallèle*, pl. 63 and 65). The corona was surmounted solely by a fillet or small cyma (figs. 19 and 16), the thickness of which received and concealed the ends of the roof-tiles, the members below the corona belonged evidently to the frieze. At a later period, the origin of the cornice being lost sight of, the mutules were suppressed; the inclination of the soffit being replaced by a sunk planceer (*refouillements*), which sinking was made good by the introduction of another small cyma, between the soffit and the frieze. I have before mentioned what was the intention of the great cyma, which from the cornice of the pediment, passed afterwards into the lateral ones. Such was the state of deviation from the principles of architecture, when the Romans, after conquering Greece, transplanted the arts into Italy. That nation, far from regarding these first secessions as abuses, believed themselves aiming at perfection in adding new, but motiveless detail, to the already too much encumbered cornices, the corona of which, ere long, subsided into one of the least important members; as may be seen in the entablature of the temple of Fortuna Virilis (fig. 11).

Modern Architects, in prolonging the roofs beyond the great cyma, have rendered the corona altogether as useless as the other moldings, the combinations of which they have capriciously varied; so that had they not retained the sunk planceer, we should with difficulty recall the original destination of this essential part of the cornice, and it would have been better to have suppressed entirely the pendant fillet (*mouchette*), as this extra labour tends only to augment the confusion in the unpleasing projections of their profiles.

"It is also a truth in architecture," says QUATREMERE de QUINCY, "that its charms have originated with its necessities. Of this, the Egyptian entablature offers an example. This part, so beautiful and so rich in Grecian architecture, owed its richness and beauty to all those essential accessories to which the necessary corelations of the soffits, beams, and rafters of the roof, and coverings, had subjected both the model and its copy. Egyptian architecture, necessitated by its imitative principle (grottos) to fewer requirements, drew its origin from a source less prolific of beauties, etc." (QUATREMERE, part ii, p. 118).

dentils of the horizontal cornice repeated in the cornice of the pediment, in which they are placed perpendicular to the first; but we shall moreover remark, that one portion of these ornaments is traced vertically, and the remainder perpendicularly, to its slope. This last method has been devised only by some modern Architects,[15] who, desiring to appear scrupulous about principles, have pretended thus to approach nearer to the origin of modillions, imagining that they recognized in them those timbers of the roof, which are usually at right angles to the slope.

The Romans, more wise, having once entirely abandoned these principles, have not affected a return to them, but have made the lateral faces of their modillions and dentils vertical. Having departed so far from the Greek principles, it is, then, the Roman monuments which we must adopt as models; or, if we hesitate here, it would perchance be preferable to suppress these ornaments entirely in the cornices of pediments, reserving to oneself the power of replacing them with sculptured mouldings;[16] or, better still, to diminish in the same proportion the number of members under the corona, a simplicity which would the better suit the cornices of tympana, inasmuch as these last are sufficiently adorned with the bas-reliefs, with which it is the custom to decorate them.

And now, in closing my remarks relative to the cornices of pediments, I have but to repeat here the principle adopted, viz., that such of the members as are a repetition of the members of the horizontal cornice, should be equal to these last, both in projection and height, and that to fix the proportions of the cornice of a pediment (fig. 22), it is necessary to make it follow a line *a*, *b*, perpendicular to its slope, and equal to the right line A, B, which embraces all the members of the horizontal cornice, and, in this particular instance, the astragal that Vignola made dependant upon the frieze.

ON THE ACROTERIA.

The centre Acroterium,[17] or that which is placed on the apex of pediments, is to be distinguished from those which are situated at the extremities of the slopes. The plain faces of both one and the other[18] are always, in modern architecture, flush with the upper diameter of the columns, and therefore necessarily in line with the plain face of the tympanum, frieze, and entablature (figs. 5 and 3).

The acroteria at the angles can be made either square (c, fig. 4), to receive a single figure only, or be prolonged up to the slope of the pediment, for the purpose of supporting groups.

They are usually capped with a small cornice, consisting either of a simple band, or, more frequently, of a cornice analogous to that of the pedestals of the order to which they are applied. According to Vitruvius, the height of the angle acroteria should be, exclusive of the cornice, equal to that of the tympanum of the pediment they surmount; whilst the one in the centre should exceed those at the extremities by 1-8th of their height; the cornice to both being 1-6th of the height of those at the angle: but this rule is applicable, at the utmost, to tetrastyle façades, and cannot be so to those which embrace a larger number of columns, since, as the height of the tympanum increases in ratio with the length of the base of the pediment, it would follow that the angle acroteria would form a species of high wall upon the pediment, similar to that which is shown at fig. 12, Q P Y.

Scamozzi has, in consequence, found it more suitable, as it is in fact more reasonable, to make the height of the acroteria depend on the proportions of the cornice of the pediment to which they appertain, the cornice itself being in relation with the rest of the order. Treated thus, the greatest height of the angle acroteria, with their cornice, will be equal to the projection of the cornice of the entablature; that is to say, *m n* will be equal to *k l* (fig. 8); and the central acroterium will be in height 1-8th more than those at the angles.[19]

JAMES M. LOCKYER.

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[15] MANSARD, in the pediment of the church of Ste. Marie, Rue S. Antoine; GITTARD, in the lateral entrance to S. Sulpice, Paris.

[16] PALLADIO cites an example of a pediment in the town of Schisi, the pendant cornice of which is without modillions, although the others which are level, have them. In lieu of modillions, there is a great cyma covered with foliage (PERRAULT, *Vitr.* b. 2).

[17] With the exception of the portico at Athens, upon which, independently of two small bases, scarcely visible, at the extremities of the slopes of the pediment and on the same line with the frieze, we see at its summit a species of large pedestal, (which Stuart supposes to have been surmounted by an equestrian statue of Lucius Cæsar), and which has some affinity with the acroterium on the apex of pediments, we find no proof that the Greek temples now remaining were surmounted by statues above their roofs: it was only later that they crowned their buildings with figures in terra-cotta, such as those which, according to Pausanias, were on the summit of the royal portico, representing Theseus precipitating Sciron into the sea, and Aurora carrying off Cephalus (*Voyages d'Anacharsis*). The Romans, on the contrary, surmounted all their edifices with statues; and thus, these conquerors of the earth, after dedicating altars to their emperors, and replacing in the sanctuaries the statues of Jupiter, Optimus Maximus, with those of Octavius and Nero, banished the images of their gods to the tops of their temples; where, little better than sign-boards, they soon received the smoke alone, which escaped from the sacrifices lavished upon the idols of a shameful adulation. Hence originated these mutilated pedestals, which seem scarcely to rest on the sides of the pediment, and which Vitruvius finding in vogue in his time, regarded as an essential accessory to this part of edifices.

The acroteria of Roman buildings have been imitated by modern Architects; but, in our time, it seems the example is no longer followed; and if, in some cases, it may have been deemed convenient to preserve those of the angles, because they accord with the pedestals or plinths, with which it has recently been the fashion to decorate the lateral entablatures, the central one, at least, has been suppressed, Architects contenting themselves with expressing, either by bas-reliefs in the tympanum, or inscriptions on the frieze, the dedication of the building, or the munificence of its founder.

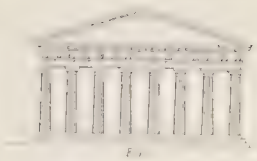
[18] In the portico of Athens, the angle acroteria are very slightly elevated, and bear almost entirely on the cornice. There are similar small acroteria to the temple of Minerva; but neither examples having any true bearing, it is impossible to believe that they were destined for the reception of statues.

My only acquaintance with the last-mentioned acroteria is from the work by Le Roy; and remarking therein, that their length is only consequent on the very slight return of the great cyma, I conceive that these small plinths (which were moreover concealed from view, by the projection of the cornice) were intended solely for the reception of the rain-water, to collect, and carry it off by means of the lion's head, visible only at each extremities of the lateral cornices of this temple.

[19] This rule of Scamozzi is cited by BLONDEL (*Cours d'Architecture*), in which work the author, notwithstanding his explanations, is too often not sufficiently precise in points constituting the object of the question he discusses. Thus, in making the height of the angle acroteria equal to the height of the cornice, we are not informed whether we must include in this projection that of the great cyma; which I consider should be the case: again, we know not whether this height should be taken above the horizontal cornice, or from above the slope of the pediment; I believe the lattef: nor do we learn the exact proportions to be allowed to the cornice of the acroteria, when we read only that such cornice should be proportioned to the height of the die.

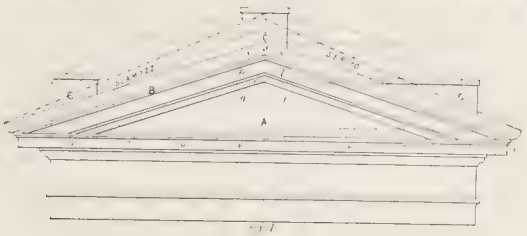
These proportions I have herein endeavoured to fix; and have done so without discussion, because I should otherwise have lengthened, without any increase of utility, a paper already sufficiently long; and before the publication of which, the erection of a large number of noble edifices tended to prove, that masters in the art have by no means absolute need of fixed rules to do well.

PEDIMENT











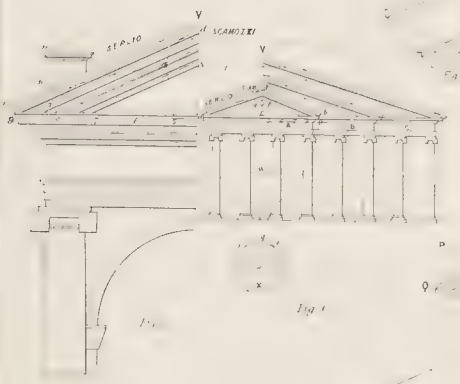
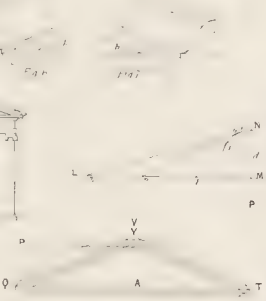
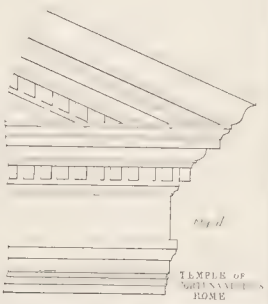


Fig. 1





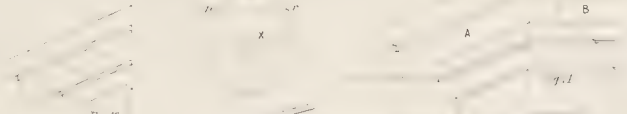
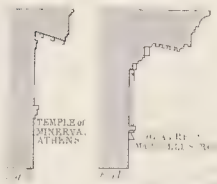


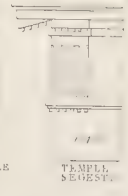
Fig 13.



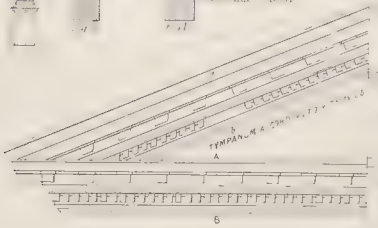














THE

DICTIONARY OF ARCHITECTURE.

QUADRA. A term used by VITRUVIUS, i, 3, for a plain plinth, or *socle*, as to a pedestal, statue, vase, or other ornament. Also a fillet or listel, as in the base of the Ionic order separating the scotia. TÆNIA. AQUINUS, *Vocab. Arch. Œdif.*, 4to., Rome, 1734, s. v.

QUADRANGLE and quadrilateral. Terms denoting a figure with four sides in the same plane. PARALLELOGRAM. RECTANGLE. SQUARE. The large inner courtyard of a public or private edifice, and around which the buildings are erected.

QUADRANGULAR STYLE. A term used by some writers for a building erected in a square form, or in that of the letter H.

QUADRANT. The fourth part of a circle. It was the name given to that part of Regent Street, London, formed in that shape, designed 1813-16 by John Nash. The Greek Doric cast-iron columns to the covered walk on each side, were removed 1848. The metal arm, of which there are several sorts, for regulating the opening of a fanlight, casement, or skylight.

The term occurs in the will of king Henry VI, to denote a quadrangle in the college at Eton, and is similarly used in other old documents. The octangular division of a spire was also called a quadrant.

QUADRATOR. Particular artificers are mentioned by TEMANZA as among the ancients whose business it was to smooth the joints of stones for arches; and he quotes an ancient writer as mentioning them by the title of Quadratorii. While, 1326-56, at Westminster, the glazier and vitrarius had each an annual stipend, weekly wages, and board, the "quadrator" had a furred robe; the "talliator", weekly wages and board, and so on; BENTHAM, *Ely*, Supp., 4to., Norwich, 1817, p. 66. 5.

QUADRATUM OPUS. The earliest kind of construction in stones, which are oblong and squared, but not necessarily square; and in the earliest examples are laid like Flemish bond in English brickwork. ISODOMUM. The wall of Romulus at Rome is of *tufa*, put together without mortar; this continued for about a century after the foundation of Rome; and then the stones became smaller; *peperino* from Albano came into use, and the *lapis Gabinus*. The temple of Jupiter Feretrius, built in year 4 of Rome, B.C. 749, discovered 1871, is an example of the first manner. PARKER, *Archæology of Rome; Construction of Walls*, 8vo., Oxford, 1874, p. 4, 49, and views. CHIUSI.

QUADREL. Explained as an artificial stone, perfectly square, much used formerly by Italian architects. Quadrels were made of a chalky or whitish and pliable earth, and dried in the shade for at least two years. 1. 2.

QUADRI (CARLO), did 1695 the front of the church of Sta. Maria Maddalena, near the Pantheon at Rome, according to LETAROUILLY, *Rome Moderne*, fol., Paris, 1855.

QUADRIFORES. Folding doors whose height was divided into two; when in one height they were termed "fores valvatæ" or "valvæ"; VITRUVIUS. FORIS.

QUADRIVALVE. (Lat. *fores duplices.*) Doors with four folds hung like back flaps to shutters, are called *duplices complicabilesque* by ISIDORUS, *Orig.*, xv, 7; or "conduplicabiles fores"; and by VITRUVIUS, iv, 6, dupliciter complicantur. Some grooves and sinkings in the sill of the entrance to the House of Acteon at Pompeii, indicate the doors to have been four-leaved in width; COCKBURN and DONALDSON, *Account, etc.*, fol., London, 1827, p. 8. In the House of Nereids, the aperture from the atrium to the peristyle being wide, the door was divided into four leaves; this is plain from the holes sunk in the marble threshold; LIBRARY OF ENTERTAINING KNOWLEDGE, 8vo., 1832, ii, 203. Indications existed in the House of Holconius of folding doors, given in MAZOIS, *Ruines*, fol., Paris, 1829, who, noticing the quadrant marks, mentions other doors as bivalve and quadrivalve; the false door in the portico of Eumachia seems to represent three leaves. 25.

QUADRIGA. The ancient four-horsed chariot. Tarquin had ordered from Veii one or more fictile cars to adorn the pediment of his new temple on the Capitoline, according to the Etruscan fashion in architecture. It became one of the seven sacred things of Rome; DENNIS, *Etruria, etc.*, 8vo., 1848, i, 57. In the museum of the Vatican at Rome, is part of an antique marble biga, or votive car, which has been restored; GRUNER, *Ornamental Art*, fol., London, 1850, pl. 16; a plaster cast of it is in the South Kensington Museum. Their different representations on the consular coins, in ARCHÆOLOGIA, ii, 45-6.

QUADRIO (GEROLAMO), 19 Sept. 1658, was appointed to assist C. Buzzi at Milan cathedral; and 3 Oct. was nominated architect. His brother, GIAN BATTISTA, succeeded A. Biffi, 3 August 1686 until 1692; MILANO, *Raccolta delle migliore fabbriche*, 4to., Mil., 1820, p. 103. ANTONIO, son of Gerolamo, was engaged there from 24 Feb. 1723. 27.

QUADRIPARTITE VAULT. A term given by WHEWELL to a vault (derived from the Norman and uniformly practised during the Transitional period) formed of arches of equal span and height cutting one another. HEXPARTITE vaulting is an advance beyond this. Examples occur in the north choir aile of Lincoln cathedral; KING, *Eastern Cathedrals*, 1861, p. 300: and in the choir of New Shoreham church, Sussex; SHARPE, *Arch. History*, 4to., Chichester, 1861, p. 32.

QUADRIPORTICUS. A quadrangle with a portico, gallery, or ambulatory, on each side, as to the church of S. Clemente, at Rome. 19.

QUADRIVIUM. The Latin term for the open space where streets intersect; at Milan it is called (It.) *carrobio* (*Handbook*,

North Italy, 1846); and perhaps, Circus, in London; Fr. *carrefour.*

QUAGGY TIMBER. Trees grown in loose soils produce timber which is so called; it is full of shakes and clefts in the middle; Building News *Journal*, 1870, xviii, 426.

QUAGLIO (Giovanni Maria), of Luvino or Luino, on the lake of Como, was engaged as engineer and architect in the imperial service at Vienna. He left two sons, Lorenzo and Domenico. 14.

Lorenzo, born 25 July 1730, at Luino, accompanied his father to Vienna, and there studied. He designed the theatres at Mannheim and Frankfort; besides many other edifices. He died 7 May 1804 at Munich. His son Giovanni Maria, born 1772, was a distinguished architectural and scene-painter. 14.

Domenico was a painter, as were also his two sons Joseph and Julius; and the four sons of Joseph (who died 23 Jan. 1828, aged 83, at Munich), namely Angelo, Domenico, Lorenzo, and Sinon, were also eminent. The oldest, Angelo, made the drawings for Boisserée, *Cologne Cathedral*, large fol., Stuttgart, 1821-32, and died aged 37. Domenico, the second son, born Jan. 1, 1786, at Munich, by his paintings chiefly of mediæval edifices, promoted the taste for that style and art. He published *Twelve views in Munich*, fol., 1812; and *Denkwürdige Gebaüde des Mittelalters in Deutschen*, 24 col. pl., fol., Carls., 1818-23; and 1829 accompanied Gally Knight in a tour to Italy as his architectural draughtsman. He died 9 April 1837, at Hohenschwangau, where he was employed in restoring and improving the château; the works were continued by D. J. Ohlmüller. 14.

QUAKERS or Society of Friends; see Meeting House.

QUANTEIS, so called, or Francisco José, built the pretty edifice in the quarter of S. Oviedo at Oporto.

QUANTITIES. The detailed bills of materials and labour estimated to be required for the erection of any building; "taken off" from the drawings and priced and monied out by the builder to arrive at his estimate of the cost. Before the present system became general, each tradesman made his own estimate in his own trade; after that, the general builders each made their own separate estimate, leading to confusion, doubt, and litigation. After 1825 the practice commenced of one set of quantities only being taken out and supplied to each of the builders about to tender, who thus were placed in equal positions and the probability of differences much reduced. The system has now been elaborated to a high degree of perfection and is exhaustively explained in every detail in Leaning, *Quantity surveying*, 8vo., London, 1880; a comprehensive treatise on its principle and practice. Institution of Surveyors, gives Saunders, *Quantities and Quantity Practice*, in *Transactions*, xii, 279; Cates, *The Surveyor's Decalogue*, p. 296; and Turner, *The Law as affecting Quantity Surveyors*, in *Transactions*, xiii, 43. Royal Institute of British Architects, *Sessional Papers*, May 1879, gives Honeyman, *Bills of Quantities and their proper relation to Contracts:* also papers read at "General Conference of Architects", 1871, 1872, and 1874. Reid, *Young Surveyor's Preceptor*, 4to., London, 1848; and *Surveyor's and Builder's Assistant*, 4to., London, 1848. Fletcher, *Quantities*, 8vo., London, 1877. The Builder, Building News, and Architect, *Journals*, have frequent references to this subject from about 1865. Measure and value. Measurer. A. C.

QUARENGHI (cavaliere Giacomo), written Guarenghi in some books, born 20 Sept. 1744, at Bergamo; studied as a painter under Mengs and S. Pozzi. He left Rome at the invitation of the empress Catherine II (1762-96), for S. Petersburg, and designed the palace at Szarcoselo, Tzarscocelo, or Zarskojesilo, for grand duke Alexander (Loudon, *Encyc. of Gardening*, 1850, p. 192); a palace for il principe Bisbarotko; country house, Elghammer a Suderinnnie, for count de Stading; the Guards' riding school, S. Isaac's Square (i, 422); *cir.* 1780, Institut de Demoiselles nobles, adjoining the convent Smolni, and Taurida palace (ii, 222-4); house of prince Paul Gavrilovitsch de Gagarin; sculpture gallery in palace of count de Cheremeteff; 1780-82, theatre at the Hermitage palace, and the vestibule of the gallery of the French school of painting (i, 520, 531); 1798-1800, Catholic chapel for the knights of Malta, as executed, and also as at first designed; 1781, pavilion in the English park, at Peterhoff; boutiques du Cabinet Impériale; 1803? hôpital de la Litaine; first design for the triumphal arch, and as executed with four Corinthian columns (ii, 143); and also ceiling of dining hall for the archduchess Maria Beatrice at Vienna; the riding house at Monaco; and the house for count de Cheremeteff at Moscow. These designs, with others, are comprised in his work *Edifices construites à S. P., d'après ses plans et sous sa direction*, 54 pl., fol., S. P., 1810; and *Fabbriche e Disegni*, 59 pl., fol., Milan, 1821, republished by his son Giulio, after his father's death in 1817, probably at Milan.

Granville, *S. Petersburg*, 8vo., London, 1835, as referred to in brackets. Svinin, *Descr. des objets—de S. Petersb.*, 4to., S. Pet. 1816-28, gives a view of the hospital for the sick poor (iii, 101); and describes the arcade between the Hermitage palace and the theatre (iv, 11); the loge de Raphael belonging to the palace of the grand duke Constantine (iv, 13); the third corps of the edifice, containing the *chefs d'œuvre* of Pericles (iv, 15); and the front of the palace at Tzarsco Selo (ii, 167). S. Petersburg. A collection of his drawings is exhibited in the academy of Fine Arts at Vienna. 14.

QUARR, or Quarrer, ABBEY STONE. The quarry is situated at Binstead, near Newport, in the Isle of Wight. The stone, of the tertiary shell limestone, or Limnean limestone formation, was used probably at Quarr Abbey about three-quarters of a mile distant; in the piers of the tower (which fell) at Chichester cathedral; and in parts of Winchester cathedral, by William of Wykeham, who purchased the free use of the quarries; Walcott, *Life*, 8vo., London, 1852, p. 48. The strength of the stone was discussed by Burnell, at Roy. Inst. of Brit. Architects, *Sessional Paper*, 1860-1, p. 256-62; and in Builder *Journal*, 1861, xix, 134. Bristow, *Tertiary Fluvio-Marine formation of the Isle of Wight.*

QUARREL; ("1577-8 the glase windowe quarrelles", Surtees Society, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, p. 350), now commonly written quarry. (Fr. *carré; quarreau.*) A paving brick, tile, or stone, of similar shape. Exhibition of 1851, *Illustrated Catalogue*, i, 105. "A quarry is a square piece of glass, of any size from 20's to 12's, set arras-like with the point upright. Half quarry or half, is when cut perpendicularly from point to point; End half is the overthwart top and bottom of a quarry. A pointed quarry is one much higher than broad;" Holme, *Academy, etc.*, fol., Chester, 1688, ii, 385. In 1602 a quarrel of glass cost one penny (A. P. S.). In 1703 and 1736, a quarrel is described as "of two sorts, square and long, and varying in size from 8's, 10's, 12's, 15's, 18's and 20's, that is, 8 quarrels of 8's make a foot of glass, 10 of 10's, and so on. The angle of the square quarrel is 77° 19′; that of the acute or long quarrel is 67° 22″. A. and N. Powell of Whitefriars Glass Works, patented 1845 Jan. the process of making quarries or other panes of glass, either plain or ornamental, by casting the metal into iron or brass moulds, with a sinking of the proposed ornament, and afterwards pressing it under a fly-press. There are several varieties made. Leadwork. Lozenge. 4. 16.

Gidde, *A Book of Sundry Draughts—for Glaziers*, 8vo., London, 1615-6; partly reprinted by Shaw, with additions, 8vo., 1848. *Flower quarries* in Ecclesiologist *Journal*, 1843, iii, 20; and 1845, iv, 147; and *Instramenta Ecclesiastica*, No. 7. *Glass quarries from Exeter Cathedral*, in Exeter Architectural Society, *Transactions*, 4to., Exeter, 1849, pl. 17-26. Franks, *Ornamental Glazing quarries—ancient examples*, 112 pl., 8vo., Oxford, 1849. Rowe, *Ornamental Glazing quarries*, read at Yorkshire Architectural Society, in Associated Societies, *Reports and Papers*, 8vo., 1871, p. 93-107. *Quarry glazing*, in Building News *Journal*, 1872, xxii, 96. Lee, *Glossary*, 4to., 1877.

QUARRELLE. The term formerly probably applied to the

opening in tracery, which is so small as to afford room for only one quarrel of glass. QUERELLE. 16.

QUARRIER. Late Latin, quadrarium, quarrarium, carraria, and carrarium; hence the old word querrour. The workman who gets the stone in a quarry.

QUARRY. The artificial excavation from whence various materials used in building are obtained. *Bath stone* and its quarries and quarrying, BUILDER *Journal*, 1862, xx, 613. *Blasting granite*, BREWSTER, *Journal of Science*, v, 339. BURGOYNE, *On Blasting and Quarrying of Stone*, 12mo. (Weale), 1860, 4th edit. SIM, *On the Quarrying and Blasting of Rocks*, in CIVIL ENGINEER, *etc., Journal*, 1855, xviii, 358-60. LOW, *Patent boring machines, idem*, 1865, xxviii, 245-7. HARTWIG, *Celebrated quarries, in Subterranean World*, 1872; and BUILDING NEWS *Journal*, xxiii, 200. CATACOMB. 14.

The manor of Plumpton, near Knaresborough, Yorkshire, bought 1760 by D. Lascelles, esq., had a disused quarry, from whence the stones or Devil's arrows at Boroughbridge are considered to have been taken; the twenty acres were turned into pleasure grounds, "unequalled in Great Britain"; supposed to have been carried out from the description in BRYDONE, *Travels in Sicily*, 8vo., 1773 (which has gone through nine editions besides translations) of a similar one near Syracuse; *Beauties of England*, 8vo., 1812, xvi, 658. The quarry, near the lake at Fonthill, Wiltshire, was formed into a "rootery", under the directions of J. B. Papworth. Whitworth has converted the Derby Dale quarries into rock gardens. GROTTO. ROCKWORK.

QUARRY BED; see BED.

QUARRY DAMP, or SAP. The natural dampness of the stone when in the quarry. MOISTURE. EVAPORATION. ALLGEMEINE BAUZEITUNG, 1837, p. 51.

QUARTER or balk; Norway. See JUFFER; and balk.

QUARTER. An old term for a square panel, as used in the contract for the tomb of the earl of Warwick; BRITTON, *Arch. Antiq.*, iv, 12. QUERELLE.

QUARTER. See ANVIL, B, in woodcut.

QUARTER, or QUARTERING (Fr. *pan de bois*), called "standard" in the north; and "stud" in Lancashire and London. An upright piece of timber fixed between the punchins and posts to lath upon. PARTITION. Quarters are single and double; the former are sawn stuff 2 ins. thick and 4 ins. broad. The latter are sawn 4 ins. square; MOXON, *Mech. Exercises*, 4to., 1679, p. 171: and as brought out of the west country, $1\frac{3}{4}$ by $3\frac{1}{2}$ by 8 ft. long; and $3\frac{1}{2}$ by 4 by 8 ft. long (p. 140): the carcass is not completed till the quarters and braces between the principal posts and posts are fitted in (p. 141). A short piece is called a *jack quarter*. Quarters are usually placed according to the lengths of the laths; or of the bricks in a BRICK-NOGGED partition. INTERQUARTER. 4.

QUARTER CHOIR. The term applied, from tradition as well as from the seats and desks, to the church at Yeovil, Somersetshire; COLLINSON, *Somerset*, 4to., Bath, 1791, iii, 208. The origin of the name is also *supposed* to have had some connection with the fact that the side arches do not, as generally, terminate at the transepts, but are prolonged each side of the choir to the commencement of the presbytery. W. P.

QUARTER GRAIN. The grain in wood running in straight lines towards the pith. GRAIN. LATH. 4.

QUARTER HEAD or bill brad, for soft and hard wood floors, of several sorts, from 10 to 32 lbs. per M., and from 14 to 54 lbs. per M., are fit for shallow joists that are subject to warp, or for floors laid in haste, because the "bill" to the head hinders the boards from starting, but the work is not so smooth as with plain brads. BRAD. 4.

QUARTERING. "The upright trimming and the braces" in a front to a timber-framed house. It does not include the principal posts, jambs, and window frames; MOXON, *ut supra*, p. 167. PANE WORK. POST AND PAN. 4.

QUARTER PACE or SPACE. (Fr. *palier* or *repos*.) The level between two ramps or flights, and also at the returns of steps, in stairs. FOOTPACE.

QUARTER ROUND. The same moulding as an OVOLO ECHINUS. EGG AND ANCHOR. 4.

QUARTZ. A mineral, also called rock crystal, the native oxide of silicium; and siliceous or flint earth, and silicic acid. It occurs crystallized and massive. The primary form of the crystal is a rhomboid; it is generally met with in hexagonal prisms terminated by hexagonal pyramids; when the prism is entirely wanting and both pyramids are present, the crystal is a dodecahedron with triangular planes. It scratches glass readily; and is colourless when pure. The crystallized quartz found in Cornwall and near Bristol are known as Cornish and Bristol diamonds. It is one of the constituents of granitic and the older rocks. From its varieties, colours, etc., it is known as hornstone, chert, swimming stone; brown or smoky, purple or amethyst, blue or siderite, green, chrysoprase, yellow and red; amorphous, and its varieties as agate, avanturine, flint, flinty slate, and opal; chalcedony, heliotrope, onyx, plasma, sard, sardonyx; jasper, ribbon jasper, and Egyptian jasper. SAND. SILICA. 14.

Quartz veins in various stones; ANSTED, *Elem. Course*, 8vo., 1856, p. 513; 520; mica, 405.

QUATREFOIL; Katur or Cater (Ger. *vierpass*). An ornament in Gothic architecture formed by a moulding disposed in four segments of circles cutting each other, or nearly so, and finished by a CUSP. OYLEMENT. BENTHAM appears to have been the first to apply the terms trefoil, quatrefoil, to ornament, which were originally confined in heraldry to groups of leaves. "The peculiar split quatrefoil, which is seen at Canterbury and many churches in Kent, is found in the triforium of the octagon at Throndheim;" ECCLESIOLOGIST *Journal*, 1859, p. 344. Query, also at Chartham church, as in BRANDON, *Analysis*, 4to., 1847, decorated pl. 22. 16. 19.

The quatrefoil in a circle is said to have been first used in Venice, about 1424, as in façade of the palazzo publico; SELVATICO, *Archit. in Venezia*, 8vo., Ven., 1847, p. 114.

QUATREMERE DE QUINCY (ANTOINE CHRYSOSTÔME), born Oct. 21, 1755 at Paris; travelled 1776-9 to Rome and Naples; again 1782 to Italy; and to England about 1815. The following list comprises his chief publications on Art. A memoir, *Quel fut l'état de l'Arch. chez les Egyptiens*, etc., was 1785 crowned by the Académie des Inscriptions. *Architecture*, in the ENCYC. MÉTHODIQUE, 3 vols., 4to., 1788-1825. *Essai sur l'idéal dans les applications pratiques aux œuvres de l'imitation propre des arts du dessin*, 8vo., 1813. *Essai sur la Nature, le but, et les moyens de l'imitation dans les beaux arts*, 8vo., 1823; 1837; translated by J. C. KENT, 8vo., London, 1837. *Dict. historique d'Architecture*, etc., 2 vols., 4to., 1832-3, being 2nd edit. of the Treatise. *Monumens et ouvrages d'Art antiques restitués*, etc., 2 vols., 13 pl., 4to., 1826-29. *Restitution de deux frontons du Temple de Minerve à Athènes*, 4to., 1825. *Histoire de la vie et des ouvrages des plus célèbres Architectes du xi siècle jusqu'à la fin du xviii*, 47 pl., 2 vols., 8vo., 1830. *Le Jupiter Olympien, ou l'Art de la Sculpture antique*, 31 pl., fol., 1815. *Restitution du tombeau de Porsenna*, pl., 4to., 1826. *Histoire de la vie et des ouvrages de Raphael*, 8vo., 1824; 2nd edit. 1833; translated by F. LONGHENA, 8vo., Milan, 1829. *Hist. etc., de M. A. Buonarroti*, 8vo., 1835. A comprehensive list of his publications is given in *Universal Catalogue of Books on Art*, 4to., 1870. He died 28 Dec. 1849. His tomb designed by Godebœuf is given in ENCYC. D'ARCH., 1853, iii, pl. 15. 14. 112. 113.

QUATTROCENTISTI. The artists of Italy practising from the middle of the 1400 era (1450), or XV cent. as usually called in England, including those who may not have died until 1550; SELVATICO, *Archit. in Venezia*, 8vo., Ven., 1847, p. 504. CINQUE-CENTO. ITALIAN ARCHITECTURE. ORNAMENT (p. 38).

QUAY; formerly written KEY. A long wharf parallel with the side of a harbour, river, or canal, for affording facility for the landing of goods and passengers. In Paris there were in 1825 forty-two quays extending from east to west about five miles, on both sides of the river, and distinguished by different names: their completion was due to the emperor Napoleon. The quay at Yarmouth in 1814 was allowed to be the most

extensive and finest in Europe, that of Seville alone excepted. S. Petersburg possesses fine quays; as also does Dublin, its old quays had been rebuilt 1817 in granite. At Amsterdam, the quays, of which one is 140 ft. wide, and about 2 miles long, are on each side of the four great canals.

Brees, *Glossary*, 8vo., 1853. Brees, *Railway Practice*, 4to., 1840, ser. 2, pl. 50. Mahan, *Civil Engineering*, 4to., Edinb., 1845, p. 138. Cresy, *Encyc. of Civil Eng.*, 8vo., 1861. Miller, *Structures in the Sea, without Coffer-dams*, in Civil Engineer, *etc., Journal*, 1865, xxviii, 132, 174, 214, from Institution of Civil Engineers, *Proceedings*. Cylinder. 25.

QUEBEC. The capital of the province of Lower Canada; the Legislature was removed 1875 to Ottawa. Founded 1603 or 1608 by S. de Champlain on the site of the Indian village Stadacona, it remained to France until 1759, when it was taken by the English. It is situated on the river S. Lawrence. The upper town has two suburbs; the lower town, the seat of business, has also three suburbs; the large fires of May and June 1845, Oct. 1866, and June 1876, caused great injury. Many of the houses and buildings are roofed with tin or iron, which retain their brightness for several years. The Protestant cathedral, with a lofty tower, was designed after that of S. Martin's-in-the-Fields, by col. Robe of the artillery, and cost £20,000. The Roman Catholic cathedral dedicated to Nôtre Dame des Victoires, holding 4000 persons, is plain, but with a cut stone front added 1844; it has a tower and tin covered spire. A Scotch free church (Gothic), and with a spire. A column, now 40 ft. high, to Wolfe, 1834, renewed June 1849 (Illustrated London News, xv, 28); an obelisk on a pedestal, 65 ft. high, to Wolfe and Montcalm, 1827-8, by Major Young, 79th Highlanders; and an iron column with a statue of Bellona in memory of the battle of 1760.

In the *upper town* are: the former parliament buildings, previously the palace of the bishops (Ionic), three sides of a square, and lofty dome, burnt before 1854, was probably designed 1812 by J. M. Gandy of London: and a "Government house" was "designed" 1813 by Jef. Wyatt: the château de S. Louis was burnt 1835 and not rebuilt: Jesuits' college, founded 1633, a quadrangle three stories high, used as barracks for 2000 men after 1812, proposed site 1875 for the provincial legislature: hôtel Dieu, nunnery, and hospital, founded 1636: grand seminary and naval university, one wing burnt 25 March 1865: post office, 1875: Ursuline convent for education, founded 1641: court-house, burnt June 1876: city hall; with large residences, the chief hotels, and stores. The Canada military asylum, 1862; and Finlay asylum, May 1860, are both by Stent and Lavers (Builder *Journal*, 1860, xviii, 432). The fine custom-house, completed 1859, was burnt down 10 Sept. 1864. Short, *Twelve Views*, fol., 1761. Universal Magazine, 1759, xxiv, 93, with plan. Ackermann, *Repository of Arts*, 8vo., London, 1809, ii, 146-55. Weld, *Travels in N. Amer.*, 8vo., London, 1799; 4th edit., 1807, p. 196. Bouchette, *Top. Dict. of Lower Canada*, 4to., 1832. Hawkins, *Picture of Quebec*, 12mo., 1834. Mackay, *Guide to Cities and principal Towns*, 12mo., Montreal, 1854. Williams, *Guide through United States and Canada*, 1852. Serrell, *Report on a proposed Railway Suspension-bridge*, S. John, 1852. Sleigh, *Pine Forests*, etc., 8vo., London, 1853, p. 209. Ripley and Dana, *American Cycl.*, 8vo., New York, 1875.

QUEBEC TIMBER; see American timber, and Deal. A large quantity of white spruce deals are exported.

QUECKE (Nicolas), of Mainz, continued 1494 the dom thurm at Frankfurt-sur-Main. 92.

QUEEN ANNE STYLE. An introduction of the style of building of the xvii cent., by London architects about 1870, and so called; the name "Carolinian" has been urged for it. The Building News *Journal* of 1870, 1874-80, furnishes remarks and illustrations; the Builder *Journal*, 1875, xxxiii, 226, 285, and later volumes: and Architect *Journal*. Ridge, *The Queen Anne and its relation to the Gothic revival*, in Builder *Journal*, 1875, xxxiii, 226. Beresford Hope, at Royal Inst. of Brit. Architects, *Transactions*, 1879-80, p. 195. Stevenson, *On the Recent reaction of Taste in English Architecture*, 8vo., 1874.

QUEEN CLOSER. In brickwork; see King closer.

QUEEN POST. One of a pair of vertical supports in connection with a queen post truss in a roof.

QUEEN POST ROOF. A truss devised to cover a wide span, and formed by a tiebeam hung up by two vertical posts, called "queen posts", their heads supporting the principal rafters, which, in the early roofs, as in France, of the xiii and xiv cents. (Viollet le Duc, *Dict.*, s.v., Construction), go up to a ridge; these heads are kept in place by a horizontal timber called a collar beam, or straining piece. Collar beam roof. Joggle piece. Hammer beam. The modern queen post roof has been put up of very large spans; that over the chapel at Greenwich hospital is 51 ft. span; S. Paul's church, Covent Garden, 52 ft. span; and the old roof at Exeter hall, 76 ft. A roof on this principle can be formed with a flat over the straining beam, thus lowering the height, similarly to a Mansard roof. When the span is large, the rafters forming the queen post roof are called auxiliary or cushion rafters, principal brace, or discharging strut, by various writers. Examples are given in publications on Carpentry. It is surmised that the earliest truss of the modern principle is that by il Cronaca, 1494, of 72 ft. span, over the council hall of the palazzo Signoria, at Florence; Vasari, *Lives*, edit., 1851, iii, 87.

QUEEN SLATE. The largest sized slate usually made for roofing purposes, being 32, 34 or 36 ins. long by 16, 17 or 18 ins. wide.

QUEEN'S YELLOW. A colour formed from the subsulphate of mercury.

QUEEN WOOD. Woods supplied from the Brazils, and occasionally applied to woods of the Greenheart and Cocoa wood character.

QUELLIN (Artus). There were two of this name, both also sculptors. The elder born 1609 at Antwerp carved many statues and bas-reliefs at the cathedral in that town; and all the sculpture at the town hall at Amsterdam. He died 1668. The younger, also of Antwerp, was born 1625, died 1700. To both are attributed 1689 the design of the façade of the fish market at Antwerp, the remainder having been designed and executed by A. van der Linden about 1640. Goetghebuer, *Choix des monumens*, fol., Gand, 1827, gives plates of the market and town hall. Another Artus, sculptor and painter, was born 1630, and died 1715. 5.

QUENTAL (Aires do), traditionally at Thomar, in Portugal, was the architect of the monastery of the order of Christ in the time of king Emmanuel (1495-1521); his statue is in the façade of the church; his descendants reside at Santarem; Raczynski, *Dict. Artistes*, 8vo., 1847, p. 238; and *Lettres*, p. 333.

QUENTIN, Saint (Lat. Augusta Veromanduorum). A town in the department Aisne, in France, and situated on the river Somme. The ramparts have been converted since 1820 into promenades. It was the see of a bishopric transferred in vi cent. to Noyon. The now collegiate church, dedicated to S. Quentin, is considered one of the finest, purest, and most majestic Gothic structures in this part of France; it has double transepts, and the vaulting is 127 ft. high. The choir with its crypt was finished 1257 by Jean Bourgeois; 1372, Pierre Chaudin was maitre de l'œuvre; 1411-29 Jean Douterrains (or D'outre Rhin) worked at the roof; the transept about 1460 is by S. Trestant: the portail du midi and transept finished 1477-87 by Colard-Noël. The church is attributed by P. Bénard to Wilars de Honecort (1230-60?). The labyrinth in the pavement at the entrance is noticed s.v. Maze: and in Gailhabaud, *L'Arch.* The hôtel de ville on an eight-pillared arcade, with a tower, is attributed to Colard-Noël of Valenciennes, *cir.* 1477-87, finished 1509 (28); Gomart, *Esquisse*, 1856, and *Etude*, 1858.

Hordret, *Hist. de la Ville*, etc., 8vo., 1781. De la Fons, *Hist. de la Ville*, 8vo., 1856. Nodier et Taylor, *Picardie*, fol., Paris,

1835-48, ii, gives the hôtel de ville, and interior of the church, and a font. GOMART, *Eglise de S. Q.*, 1854, who has published several essays on the buildings in the BULLETIN MONUMENTAL, xxii-iii; *Rues anciennes—de la ville*, in BULLETIN de la Société Acad. de Laon, vii; and *Dict. des Rues*, etc., xi. LANCE, *Dict. Biog.*, 1872. 14. 28. 50. 96.

QUERCUS. The OAK tree. Its *timber* is described s.v. OAK, and WAINSCOT. The islands of the Indian Archipelago, especially Java; the eastern parts of Asia; along the Himalaya mountains; and throughout Europe; they overrun America from Canada and New Albion through California and Mexico, down to the Isthmus of Darien. While however the *genus* is thus extensively distributed, the *species* are confined within comparatively narrow territorial limits. Many of the Javanese kinds appear to be peculiar to the Indian Archipelago, or only occur near the south-eastern angle of Asia. Those of the Himalayas are perfectly distinct from the oaks of the Trans-Himalayan regions, and have not even been found on the mountains of Persia. Several of the Oriental kinds are known nowhere else; and the American species are quite peculiar to that country. On this account the species of oak are extremely numerous, probably not fewer than 150, and are difficult of distinction by unskilful persons. The following are among the most noticeable. 14.

Q. Pedunculata and Q. Robur; Common or true British oak. Leaves sessile; acorns on long stalked spikes. It is also found throughout Russia

Q. Sessiliflora; Welsh oak. Leaves with very short stalks; acorns on very long stalked spikes or sessile. This timber is usually mistaken for chestnut wood; CASTANEA. PAPWORTH, *Assumed Use of Chestnut*, 1858; and BLASHILL, *Oak or Chesnut in Old Timber Roofs*, 1878, both read at Roy. Inst. of Brit. Architects, *Sessional Papers.*

Q. Pubescens, is very similar but the leaves are smaller and woolly on the under side.

Q. Ilex; Common evergreen oak, or Holm oak.

Q. Suber; Cork tree. Warm parts of Spain, especially Catalonia and Valencia. ZIZYPHUS.

Amongst other oaks may be named—

Q. Cerris; Turkey oak. Wood beautifully mottled from having abundance of laminæ. The Sardinian oak is like it, and is greatly valued for ship building.

Q. Crinita; of Asia Minor. Used by the Turks in ship building.

Q. Annulata; Ring cupped oak. A very large tree with excellent timber; and Q. Chinensis; China oak.

Oaks of Mexico, comprise—

Q. Acutifolia; Sharp leaved oak. Large tree, producing timber of excellent quality.

Q. Sideroxyla; Iron wood oak. Timber very hard, takes a fine polish, and extremely durable under ground, or under water.

Q. Lanceolata; Lance leaved oak. Timber very hard, and very durable under ground; used in mining.

Q. Obtusata; Blunted oak. Timber very compact and strong, and taking a fine polish.

Q. Macrophylica; Large leaved Mexican oak. Doubtless the finest oak in the world; southern parts of Mexico and Guatemala. Leaves 12 to 18 ins. long. 14

An elaborate account of the genus is given in ROOKE, *Descr., etc., of remarkable Oaks in Welbeck Park*, 10 pl., 4to., 1790. REES, *Cyclopædia*, 4to., 1802-19. LOUDON, *Arboretum Britannicum*, 8vo., London, 1838; 1844, iv. *Economical uses of the Oak*, in PENNY MAGAZINE, 8vo., London, 1843, xii, 274; 288; 302; 483. ARCHER, *Popular Economic Botany*, 8vo., Lond., 1853, p. 327, 333. KOTSCHY, *Eichen Europa, etc.*, or *Illust. des Chênes de l'Europe et d'Orient*, fol., Vienna, 1862.

Oaks of America;—

Q. Alba; White, Quebec, or American, oak. United States and Canada; 70 to 80 ft. high. Comes nearest to the English oak, and is largely exported to England. It shrinks $\frac{1}{25}$ part, and loses a third of its weight when dry. The best when dry weighs from 48 to 50 lbs. per cubic foot; samples as low as 33 lbs.; used in ship building, but not in much repute.

Q. Prinus; Chestnut leaved oak; wood porous, not of good quality.

Q. Tinctoria; Dyer's or Black oak, or Quercitron. Wood strong, reddish and very coarse grained. The inner bark affords a bright yellow dye. Weighs 35 lbs. per cubic foot.

Q. Virens; Live oak. The best oak of America. Timber heavy, compact, and fine grained; of great value in ship building; does not acquire a large size. Weighs 51 lbs. 11 oz.; and 56 lbs. 4 oz. per cubic foot.

Q. Amboyna; Grey oak. Q. Coccinea; Scarlet oak. Q. Rubra; Mountain red oak in North America, but Q. Falcata in South America; weighs 32 lbs. per cubic foot. Q. Phellos; Willow oak; Timber strong but coarse. Q. Obtusiloba; Post, Box, or Box white, oak: For posts, also for knees in ships; diam. 15 ins. 14.

MICHAUX, *Hist. des Chênes de l'Amérique*, 36 pl., fol., Paris 1801. MICHAUX, *North American Sylva*, 8vo., Phil., 1817; new edit., 1871. BROWNE, *Sylva Americana*, Boston, 1832. STEVENSON, *Building Materials of United States*, read before Society of Arts for Scotland, 1841; printed in CIVIL ENGINEER, *etc., Journal*, 1841, iv, 265-8. SILLOWAY, *Text book of modern Carpentry*, 4to., 1858, who describes a "yellow oak" as next to the "white" oak: BUILDING NEWS *Journal*, 1858, iv, 1245.

BEDDING. CASTANEA. CASUARINA. FELLING. DANIZIG OAK. ÆSCULUS. OAK. WAINSCOT. 1. 14. 71.

QUERELLE. "The square space included within the arcade or division"; DALLAWAY, *Discourses*, 8vo., London, 1833, p. 172. QUARRELLE. QUARTER.

QUESNEY (F. A. DU); see DUFRESNEY (F.A.)

QUERRERO (.....) the elder, with D. de la Oliva, probably designed *cir.* 1645 and directed the edifices at Granada and in the archbishopric, being the most distinguished architects of the country. 66.

QUERY or QUESTION. INSTITUTE OF BRITISH ARCHITECTS, *Questions upon various subjects connected with Architecture, suggested for the direction of correspondents and travellers, etc.* 8vo., 1835; 2nd edit., 1841. *Queries on Churches*, in ECCLESIOLOGIST *Journal*, 1842, i, 71. *Queries to the Incumbents of Churches, etc.*, in ASSOCIATED ARCH. SOCIETIES, *Reports and Papers*, 1854, iii, xxii-iv. SOCIETY OF ANTIQUARIES, *Queries proposed to Gentlemen*, 8vo., London, 1754.

QUESNEL (JEAN) of Rouen. The first château de Gaillon having been partly destroyed by the English in XV cent., it was restored by him 1456-63, for archbishop G. d'Estourville; Georges d'Amboise rebuilt the whole as now seen.

QUESNOY or Quesney (ABRAHAM), took refuge at Berlin after the revocation of the Edict of Nantes; and in 1685 designed there the orphan house, and the temple of Frederichsstadt, after the plans of de Brosse for that at Charenton. He died at Berlin 1726. DUSSIEUX, *Les Artistes Franç.*, 8vo., 1851, p. 55.

QUICK HEDGE. A fence formed by planting quicksets (young thorn) from 4 to 6 ins. apart. When fronting a boundary it was usually planted on the soil thrown up from a ditch 3 ft. wide at top dug by its side, the ditch being the boundary, and the distance usually 4 ft. from the middle of the hedge to the extreme edge of the ditch, as may be found on testing any awarded enclosure. FENCE (p. 17). HEDGE. PLASHING. PRIVET. S. J. B

QUICK LIME (Fr. *Chaux vive*). Limestone fresh and well burned into lime. Water is added to it in slaking for use, when it becomes a hydrate of lime. SMEATON states it occupies double the space by measure that it does before slaking. LIME. LIMEWASH.

QUICKSAND. A bed of sand so filled with water, that when a hole is made in it, it refills, in which state it has almost the properties of a fluid. STANLEY, of Sunderland, *Account of some plans adopted in the north of England of sinking through quicksand*, with cuts, in CIVIL ENGINEER, *etc., Journal*, 1841, iv, 293. The plan adopted in sinking wells, in Roussillon, and applied by Brunel in the descending shafts of the Thames Tunnel, is noticed *idem*, p. 2. The works at the Kilsby tunnel, *cir.* 1835, by R. Stephenson, are described in SMILES, *Lives*, 8vo., 1877, iii, 365. FOUNDATION.

QUICKSILVER; see MERCURY. 14.

QUILLY STONE; see CALVADOS STONE.

QUIMPER, Quimper Odet, Quimper Corentin, and Kimper (Anc. Vagoritum Novum; and Cornovailles). A town in the department Finistère, a province of Brittany, in France; and

situated at the confluence of the rivers Benaudet, Odet, and Eir. It is the see of a bishop. The cathedral is dedicated to S. Corentin; the apse 1285 was consecrated 1295; the nave 1424 was finished 1484-93, and the church completed towards 1518. The richly carved portal between, and the two western towers, were begun 1424; the spires are modern but supposed to be from an old model of the original ones. A small modern building on the north side of the choir has plate tracery and is bad. The church of the Cordeliers with its cloister are in ruins. The prefecture; and an extensive former Jesuits' college, comprise the other noticeable buildings. BOURASSÉ, *Les Cathédrales de France*, 4to., Tours, 1843. POTEL, *La Bretagne et ses Mons.*, fol., Nantes, 1844. NODIER ET TAYLOR, *Bretagne*, fol., Paris, 1845-6, ii, give plates of several old houses, tower of S. Mathieu church, cathedral, church and cloister of the Cordeliers; and the towns, etc., of the locality. INKERSLEY, *An Inquiry, etc.*, 8vo., 1850. MACQUOID, *Through Brittany*, 8vo., 1877, p. 265. 14. 50. 96.

QUINCONCE; QUINCUNX. A French term for an arrangement of trees forming square and equal spaces, which seen together form parallel alleys; as at Marly, the esplanade of the Invalides, etc. DALY, *Revue Générale*, 1852, x, pl. 28. 5.

QUINCY, in Massachusets, supplies a so-called granite, of a fine gray colour, which can be quarried in large blocks. It has been used with success in many structures, and in the Bunker Hill monument, at Boston; at the Astor house, and the custom house, etc., at New York; the Harvard university at Cambridge; for railway blocks near Boston; and in the construction of the two graving docks, one at Boston and the other at Norfolk in Virginia, at a distance of over 500 miles. HINTON, *Hist., etc., of United States*, 4to., London, 1834, ii, 340. STEVENSON, *Building Materials*, in CIVIL ENGINEER, *etc., Journal*, 1841, iv, 265. TUTHILL, *Hist. of Arch.*, 8vo., Phil., 1848.

QUINCY (A. C. Q. DE); see QUATREMÈRE DE QUINCY.

QUINE. An old way of writing COIGNE.

QUIÑONES (ANDRES GARCIA DE), 1720 designed and commenced the plaza mayor at Salamanca; his son GERONIMO, with J. de Lara and N. Churriguera, completed it 3 March 1733. 66.

QUINTANA (LUCAS BERNALDO DE); see BERNALDO (L. B. DE.)

QUIRE, QUIERE, and QWERE. See CHOIR. 19.

QUIRINUS; TEMPLE TO. One of the Doric order was erected at Ephesus. VITRUVIUS, iii, 2; and vii, 9.

QUIRK. "The piece taken out of any regular ground plot or floor", as the square opening for stairs; MOXON, *Mech. Exercises*, 4to., 1679, p. 171. REDUCT. 4.

QUIRK. A small acute channel or groove, a deep indent, at the head of a moulding to clear it from its ground and so afford a deep shadow, as to an ogee or ovolo. (Fr. *Cou de crochet.*) It was used in Greek, as well as in Gothic, architecture. OPTICAL REFINEMENT.

QUIRK BEAD. A bead generally cleared out of the wood with a snipe-bill plane so as to form a section of rather more than a semicircle. COCK BEAD, and woodcut.

QUIRK FLOAT or FEATHERED EDGE. A flat board of sufficient length, one side being worked off to an edge, and used to form a quirk in plastering, as at the angle of a chimney breast when the walls are painted.

QUIT RENT. A rent usually very small in amount, paid by a freeholder and ancient copyholders of a manor, in consideration of which the tenant is free or quit of all other services, etc. In ancient writings it was called "white rent", because it was paid in silver money, to distinguish it from rent corn, which is a chief rent. BLACKSTONE, *Comment.*, ii, p. 42. 14.

QUOIN, formerly written coigne, coin, coyn, coyning, cune, quin, and quyn (Lat. *ancon;* Ital. *cantone cantonata;* Fr. *coin; encoignure;* Ger. *eckquader; ecke;* Hind. *nask*). The external angle or corner stone to a brick, flint, or rough stone, wall. Scotch, "corner" to a building; and "scuntion" to a window. "Quoins are called 'rustic quoins' when they stand (guttered off) outward beyond or from the face of the wall, commonly an inch and a half or more"; HATTON, *New View of London*, 8vo., 1708. ANGLE OF A BUILDING. A *squint quoin* is the internal angle formed by the intersection of two walls which are not at right angles to each other, thus necessitating the cutting of the stones or bricks. 4. 16. 17. 19.

At Stow church, Lincolnshire, the *quoin faces* of the transepts were partially cut away for the reception of plaster which was no doubt applied to the walling between them; ASSOCIATED SOCIETIES, *Reports and Papers*, 1866, p. 247. At Eastbury manor house, Essex, *temp.* 1572, the jambs and mullions of the windows, string courses, and angles of the turret stairs, were plastered in imitation of stone work; STREATFIELD, in ROY. INST. of BRIT. ARCHITECTS, *Sessional Papers*, April 8, 1872, p. 166.

QUOIN WORK. Ashlar stones of which the quoins are built. Formerly the vertical angular projections formed on the face of a wall for ornament. The quoins in Saxon or early Norman work are usually of hewn stones placed alternately *flat* and *on end*, and fixed either flush with, or slightly projecting from, the face of the wall. LONG AND SHORT WORK. RUSTIC WORK.

THE

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RAAB (Lat. *Arrabona*; Hung. *Győr* or *Nagy-Győr*; Ital. *Giavarino*). The capital of the county of the same name in Hungary, situated at the confluence of the rivers Raab and Rabnitz with the Danube. It was a place of some importance under the Romans; there are several Turkish prisons dating in XVI and XVII cent. The *dom-kirche* dedicated to the assumption of the Virgin, said to have been founded by S. Stephen, king of Hungary (999-1038), has a fine choir, and is chiefly XII cent. The Benedictine church with two towers (Italian); the archbishop's palace, a fine castellated structure; the *rath-haus;* the new *comitatshaus;* and the *akademie gebaude*, founded 1750; together with the great Benedictine monastery of S. Martinsberg, one of the oldest in Hungary, situate about twelve miles from the city, are of note. 26. 28. 50. 96.

RAB AND DAB; see RAD AND DAB.

RABATE, RABBET, RABBIT, and RIBBET. Old ways of writing REBATE (Fr. *rabattre*, not *rebattre*).

RABBITRY, or RABBIT HOUSE. A place for breeding rabbits. A hutch for the doe with a nest box (about 1 ft. wide) attached, 3 ft. long, 2 ft. deep, and 14 ins. high, is divided from the hutch, similar in size, for the young rabbits, by a movable partition. On the other side of this last hutch is one of a similar size for the stock bucks. Each of the hutches should have a wire door to the front, and an opening provided with a cover, secured by a small catch, at the back, from which the hutch can be cleaned out. The floor should have a fall of 2 ins. from the front to the back, and be formed of zinc, to lead off the liquid manure to the drain in a passage in the rear, or between two rows of hutches. Boxes in the house on each side of large windows, are necessary for holding the food, hay, etc. BURN, *Handbook of the Mechanical Arts*, 8vo., Edinb., 1860, p. 317. LOUDON, *Cottage Arch.*, 8vo., 1833, p. 392.

RABIRIUS, of Rome, was contemporary with MARTIAL, who mentions him in *Epigr.*, lib. vii, 456; x, 71. He is said to have designed the palace for the emperor Domitian (81-96), of which some ruins are still extant on the Palatine hill; BIANCHINI, *Palazzo de' Cesari*, fol., Verona, 1738; with many other public works at Rome; banked up the river Volturno; and formed the via Domitiana, 40 miles in length, from Pozzuolo to Sinvessa, with a bridge over the river Volturno, and a triumphal arch at the junction of the road with the via Appia. 59.

RACE. The tail watercourse of a mill.

RACE; see BRICK, manufacture of; *Brick earth* (p. 138).

RACK. (Fr. *ratelier*). The retainer of wood or iron, for the hay, usually placed above the manger in a stable, and now often forming part of the manger. It is called neck and naik in Scotland. FLAKE, or fleak, in Yorkshire. 5.

The name of the framework in which deals or boards are placed on end for air-drying. PEARC, pearch, or steer. Hence the term "rack deals"; WHITE, in *Report on Timber Duties*, 1835.

RACK RENT. The rent at which any lands, tenements, or hereditaments, are let, being a *bonâ fide* rent, clear of any other consideration, and without deduction, or allowance of any kind. NOBLE, *Professional Practice*, 8vo., London, 1836, p. 121.

RACLE (LÉONARD), born 1736 at Dijon, designed for Voltaire the works at Ferney. He obtained 1786 a prize from the academy at Toulouse for a design for a bridge of one arch of 450 ft. span. He died 8 Jan. 1791. DÉPERY, *Biogr.* LANCE, *Dict. Biog.*, 1872. AMANTON, *Notice Biographique*, 8vo., Dijon, 1810.

RACQUET COURT. A building specially constructed for a game of ball, as is a FIVES COURT and a TENNIS COURT. A Racquet (or Racket) court should be 62 ft. long by 30 ft. wide, and 28 ft. high, of substantial brick walls rendered internally with Portland cement smoothly trowelled. The entrance is by a flush door in the centre of one end; the opposite end is termed the "head wall". The floor must be of hard rubbed slabs with rubbed edges, very neatly laid so as to form a particularly even surface. On this floor are painted the "service" and "play" lines, usually about 2 ins. wide. For ventilation, iron gratings may be built into the walls flush with the plastering, the bars should be formed diagonally at an angle of 45 degrees upwards from the entrance, and not more than $\frac{3}{8}$ in. apart, so as to be in a line with, and not to hinder, the flight of the balls. Spectators are not admitted into a court during a game, therefore each court must have a gallery 10 ft. wide exterior to the entrance end, the gallery floor being 10 ft. above the court floor, and protected by a parapet wall 2 ft. 6 in. high. The whole of the interior walls, door, and floor must be coated with black varnish or a compound of tar, so that the flight of the white balls may be more readily seen by the players. An open court is preferred for fine weather; it needs a strained net 12 ft. high fixed on the top of the head wall to prevent erratic balls being lost by passing over; and arrangement for surface drainage of the floor near the walls. The roof for a covered court is best made with wrought iron ties and struts, and the ceiling boarded under the rafters; one-third of the span, viz., on each side of the ridge for the whole length of the court must be glazed with rough plate glass $\frac{1}{2}$ in. thick; ventilation can be obtained at the eaves. As the game requires special shoes and light clothing, dressing rooms and lavatory accommodation form necessary adjuncts. STONEHENGE, *British Sports*, 4to., London, (1878). BLAINE, *Encycl. of Rural Sports*, London, 1852. R. R. R.

This game superseded fives, which was played with the hand, first naked and then gloved. PALLONE. The racket court 1857 at the Prince's Club grounds, Hans Place, Chelsea,

comprises three closed courts, two of which are 70 ft. by 35 ft., and 40 ft. high; the third is 60 ft. by 30 ft., and 35 ft. high; with a gallery, and refreshment rooms, dressing rooms, and baths; ILLUSTRATED LONDON NEWS, 1857, xxxi, 179-84. Others have been erected at Harrow-on-the-Hill, and at Haileybury college; BUILDING NEWS *Journal*, 1873, xxxi, 492, 532: also at Oxford; those at Cambridge are considered an improvement on the Hans Place courts.

RAD AND DAB. A method of building with clay. "Instead of brick nogging for partitions, cob is used for filling in the framework, which is previously lathed with stout slit oak or hazel"; LOUDON, *Cottage, etc., Architecture*, 8vo., 1833, who calls it "rab and dab". It is also called "wattle and dab". DAUB. COB WALLING. TAPIA or Tapegia. 1.

RADDLINGS. An old term for the cooping or bowing in of a wall. 2.

Also stone chips large enough to be used for filling in the core of a stone wall; a corruption of riddlings, that is, pieces of stone too large to pass through a riddle or sieve. GALLET. R. R. R.

RADDON STONE is occasionally mentioned in the Fabric roll 1399-1400, as used in the works at Exeter cathedral; BRITTON, 1826, p. 96. It is probably the same as the stone locally known as Thorverton stone, a dark purplish trap, some of it very vesicular in character. It was used in parts for the filling in of the groining in the cathedral, in the foundations, and for a gutter behind one of the parapets of the west front, and (1881) is as sound as when first made. The quarry, which has been worked for generations, is still in use and produces excellent stone. In the *Memoirs* of the Geological Survey of Great Britain, Mineral Statistics, pt. 2 for 1858, p. 144-5, Thorverton stone is described as of the new red sandstone formation, used for hearth slabs, oven copings, etc.

RADI (BERNARDO) cavaliere, of Cortona, born 1634; made a design for the façade of the duomo at Florence; 1640 designed the church of SS. Agostino and Cristina, in that city (completed by G. Silvani); and assisted at the convent of S. Jacopo sopr' Arno (1576-1703). *La Metrop. Fiorentina Illust.*, 4to., Flor., 1820, p. 65-8.

RADIATING PRINCIPLE of construction; see PANOPTICON.

RADIATION OF HEAT. A motion of the particles of heat in rectilinear directions, diverging every way from a heated body, either luminous or not. The intensity of heat thus emitted from a point of radiation is obviously the same at equal distances from the point; and, at unequal distances, it is inversely proportional to the squares of the distances. The radiating particles falling upon the surfaces of any bodies in the vicinity of that from which they emanate, are, according to the nature of those bodies, absorbed in them, or transmitted through them, or, again, they may be reflected from them; and, in the two last cases, the "radiant heat", as it is called, appears to suffer modifications analogous to those which, in like circumstances, take place in light. Heat passes from one body to another without altering the temperature of the intervening medium—as through water which flows with such rapidity as not to become heated—or through ice used as a lens without melting, but inflaming wood. CONDUCTOR. NON-CONDUCTOR.

THOMPSON, count Rumford, in PHILOSOPHICAL TRANS., 1804; *Mémoires sur le Chaleur*, 8vo., Paris, 1804; and *Complete Works*, 8vo., Boston, 1870. LESLIE, *Exp. Inquiry into the Nature and Propagation of Heat*, 8vo., London, 1804; and *Relations of Air to Heat and Moisture*, 8vo., Edinb., 1813. FARADAY, *Eight Lectures on Heat*, specially reported in CIVIL ENGINEER, ETC., *Journal*, 1844, vii, 234, 288, 318, 358, 385. TYNDALL, *On Radiation*, 8vo., London, 1865; and *Heat, a Mode of Motion*, 8vo., London, 1875, 5th edit. *Radiation* v. *Hot Air*, in BUILDING NEWS *Journal*, 1879, xxxvii, 368. HEAT, *Detached Essay*, p. 3. HINE, *On Warming and Ventilating*, in BRITISH ARCHITECT *Journal*, 1874, ii, 344, 361.

RADIUS JOINT. The same as RULE JOINT, in hingeing.

RADOM. A chief town of Russian Poland, situated on the river Radomka. 50.

RAFFAELLE WARE. A fine kind of majolica, upon which scenes from ancient mythology, as well as other fancy subjects and portraits, were painted in natural colours. These designs are usually stated to have been either painted by Raffaello Sanzio, or under his superintendence (in error for Raf. Ciarla and Raf. dell' Colle, both for a long time confounded with him), the manufacture being carried on at Urbino, but it was abandoned at the end of XVI cent. POTTERY. MARRYAT, *History of Pottery and Porcelain*, 8vo., London, 1868, 3rd, edit. FAIRHOLT, *Dict. of Terms*, 8vo., London (1870). RAPHAELESQUE.

RAFFAELLO DA MONTELUPO; see MONTELUPO.

RAFFAELLO DA SANZIO; see SANZIO.

RAFFIELD (J.....), exhibited from 1797 at the Royal academy of arts in London; 1799, a design for a new cast-iron bridge over the Thames, near the Adelphi; 1803, lodge and gateway, executed for lord Hobart at Roehampton, Surrey; and 1805, design for a suspended bridge over the Danube at Vienna. He designed 1804-5 a villa at New Cross, Old Kent Road, for John Rolls, esq.; HUGHSON, *Descr. of London*, etc., 8vo., London, 1806; and 1818-9, S. John's lodge, Regent's Park (inner circle), for C. A. Tulk, esq., M.P. for Sudbury; SMITH, *Marylebone*, 8vo., London, 1833, p. 264; CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 190: and 1823, gateway and lodge at Easton Neston park, Northamptonshire, for earl Pomfret. His name does not appear later than 1825.

RAFFLE LEAF. A leaf used in ornamental foliage, in Italian work, the edges of which have small indentations; such as the ACANTHUS leaf. 1.

RAFT OF TIMBER: described in BUILDING NEWS *Journal*, 1869, xvii, 217-8.

RAFTER; BOW AND STRING; invented 1819 by George Smart of Lambeth, for forming a "flat" roof, and carrying bricks and tiles in cement, as detailed in SOCIETY OF ARTS *Transactions*, 8vo., 1820, p. 100.

RAFTER; COMMON. (Lat. *asser;* Fr. *chevron;*) LEVER and SYLES in the North; CABER in Scotland; SPAR in Lancashire and York. The lower end is called the "heel". The small timber laid lengthways in a sloping direction in a roof, between the wall-plate and the ridge-piece, usually placed 12 ins. apart, sometimes supported by a purlin, and carrying boarding for lead, zinc, or slate; or battens for slate; or laths for tiling. Besides the explanations s. v., ANGLE RAFTER; AUXILIARY OR CUSHION; BACK OF A RAFTER; BACKING OF A RAFTER or firring up; BALK or bawk; BINDING; COMMON RAFTER; HIP RAFTER; JACK RAFTER; KNEE RAFTER; are the terms *Compass rafter*, the curved rafter in the face of a gable in a timber-framed building; *Kneeling rafter*, the curved rafter supporting the collar-beam, as in some old roofs, as shown in LE MUET, *Art of Fair Building*, by PRICKE, fol., London, 1670, p. 29. Templet for spars, in CIVIL ENGINEER, ETC., *Journal*, 1853, xix, 45. Various modes of stepping the *heel* of a rafter into the beam, are shown in ROMBERG, *Zimmerwerks Baukunst*, 4to., Leip., 1846-50, pl. 32, 53. SHREVE, *Strains in Rafters*, in BUILDING NEWS *Journal*, 1870, xix, 415.

RAFTER; PRINCIPAL. (Fr. *arbaletrière; chevron de ferme*). The large timber forming the sloping sides of the truss, or principal of a roof. PRINCIPAL RAFTER.

RAFTER ROOF. A roof formed of iron rafters, tie rods, and struts. BOW, *Iron roofs of large spans*, in CIVIL ENGINEER, ETC., *Journal*, 1853, xvi, 217; *Stress diagrams for straight rafter roofs*, in BUILDING NEWS *Journal*, 1869, xvi, 6. BOW AND STRING GIRDER.

RAFTIC QUOIN. "A stone or brick which sticks without the brickwork, the edges being scraped off, in the corner of any building"; as explained 1736. It may be a misprint for RUSTIC QUOIN. 2. 4.

RAGALET. The Scotch term for a groove.

RAG BOLT or JAGGED BOLT. A metal bolt with barbs jagged thereon for driving with a heavy hammer into wood in situations where a screwed nut cannot be attached; the hole being bored much too small for the bolt, the fibres of the wood clasp the serrations and prevent the withdrawal of the bolt. R. R. R.

RAGEUR STYLE. A term used in the studios of French architects for a style derived from the Franco-Greek school carried out by second-rate artists. It is a mixture of Greek, French, Italian, Louis XIV, and Gothic, styles. Examples occur by Davioud in the exterior of the new theatres; houses in the boulevards Sebastopol and de Strasbourg, the passage Baudry de Dieu; the artist's houses by Amoudru and Azemar (BUILDING NEWS *Journal*, 1862, ix, Nov. 14 and Dec. 12; and x, 193); the studio in the place Vintimille; and many tombs in the cemeteries, with the whole of the quartier barrière Blanche.

RAGGI (ANTONIO), called "il Lombardo", born 1624 at Vicomorco in the Milanese states, died July 1686, aged 62, was chiefly a sculptor, who executed many altar pieces after the time of Algardi (d. 1654), and Bernini (d. 1680). 42.

RAGGLING. A northern term for a ceiling-joist.

RAGGUZZINI (.....), of Naples, is stated by MILIZIA, *Lives*, 1826, ii, 338, to have been one of the twenty-two architects who submitted designs for the façade of S. Giov. Laterano at Rome, *cir.* 1730-40. 3.

RAGLIN and RAGGLE. A northern term for a groove. "Raggled or housed" as to strings of stairs.

RAGOLD. "15 Bord de Ragold, 5s. 8d."; *cir.* 1336 at Westminster palace; SMITH, *Antiq. of Westm.*, quoted in BENTHAM, *Ely*, Suppl., fol., 66. MOULD.

RAG PAVING. Any rag stone set edgewise. It is sometimes squared, and is then used for coach tracks and footways.

RAG SLATE, or WELSH RAG. A slate obtained from Wales, and sold by the ton, which will cover about one square and a half of roofing.

RAG, RAGG, or RAGGE STONE. A stone sent from the quarry with rough sides. A dark limestone from Maidstone; see KENTISH RAG STONE. BARNACK RAG STONE. ROWLEY RAG STONE. Also York rag landings as suitable for foundations and bases. A cord or chord of ragstone measures 3 ft. by 3 ft. by 3 ft. 1 in.; BUILDER *Journal*, 1857, xv, 619.

RAG WORK. Walls erected of ragstone, in random coursed work; or coursed and hammer dressed. BOND. DIATONOS. RUBBLE WORK.

RAGUANAULT (MATHIEU), of Touraine, is supposed to have been employed after 1473 at the cathedral of S. Gervais at Lectoure (Gers); and may have designed the modern cathedral of Ste. Marie at Auch, begun 1489; and at Agen directed the works of the cathedral of S. Étienne. LANCE, *Dict. Biog.*, 1872.

RAGUSA or RAUGIA (anc. *Rausium*). A city in Dalmatia. The streets, too narrow for carts, are paved with large flat flags, and most have a gutter of running water; the *stradone* enters at each end into a double fortress with a bridge over a deep ditch. On one side of this *stradone* are the large houses, public buildings, and churches to the edge of the water; on the other, the side streets run up the mountain as narrow lines of staircases, ending at the aqueduct which supplies the town from the val d'Ombla. The *dogana*, the former Byzantine-Romanesque (or Venetian) palace; the town hall, or governor's palace, xv cent. (Florentine), said to bear a strong resemblance to the old part of the ducal palace at Venice, with seven large rich capitals, was built however 1668, the town having been nearly destroyed 6 April 1667 by an earthquake. It is the see of a bishop. The cathedral, dedicated to S. Blasius, to the Assumption of the Virgin, or to S. Biagio (S. Giles), is now of the Renaissance style; it was said to have been first erected by king Richard I of England: the Franciscan church and monastery; the military hospital; a former fine Jesuit church and monastery; and the torre dell' orologio, with much fine ironwork, bronze covers to wells, and eastern-looking marble fountains, deserve notice.

Seven miles eastward is Ragusa vecchia, on or near the site of the Roman colony Epidaurus in Illyria, founded B.C. 689 from Epidaurus in Laconia, mentioned by HIRTIUS, *de Bello Alexandrino*, c. 44. RAZZI, *Storia di Rangia*, 1595. *Notizie istorico-storiche sulle Antichità, etc., dei Ragusei*, 2 vols., 8vo., Rag., 1803. NEALE, *Notes Eccles., etc., on Dalmatia*, 8vo., 1861. STRANGFORD, *Eastern Shores of the Adriatic*, 8vo., London, 1864, p. 109-130. R. H. R., *Rambles in Istria*, etc., 1875, p. 118. HEIDER and EITELBERGER, *Mittelalter Denkm.*, 4to., Stutt., 1856-60. 14. 26. 28. 50. 96.

RAI or REI; see RHEY, in Persia.

RAIBOLINI (FRANCESCO), called il Francia, is said to have designed the palazzo Stracciaiuoli or drapers' company, now the grand albergo Svizzero, at Bologna. MUZZI, *Annali*, 8vo., Bol., 1844, vii, 313-5.

RAIL. A horizontal piece of timber, or of wood, or of metal, separating one compartment from another, as in panelling; or forming part of the framework, as in open fencing. BAR. BORDER. BOTTOM RAIL. FRIEZE RAIL. FENCE. POST AND RAIL. HANDRAIL. TOP RAIL.

RAILING. A sort of GRILLE, of wood or metal, put up to fence in a place; or to prevent persons falling into a hole, area, court, pond, ditch, etc. A BALUSTRADE is a stone railing. CANCELLUS. An iron railing was used to protect the altar in front of the small temple to Fortune at Pompeii; LIBRARY OF ENTERTAINING KNOWLEDGE, *Pompeii*, 8vo., 1831, p. 202-4. No railing should be less than 3 ft. 6 ins. high; or have spikes upon it when exposed to a public way unless the total height of the railing be above the usual level of the human eye. VIOLLET LE DUC, *Dict. Rais.*, s.v. Grille, and Serrurerie, p. 351-6; 360; 364-8. ANNALES DE LA CONSTRUCTION, 1857, iii, pl. 28, shows a cheap wrought-iron fence railing.

Securing rails to stonework is done by running in lead around it in the sinking; by Portland cement; and by sulphur.

RAILTON (WILLIAM), born ....., became a pupil of W. Inwood; was at Corfu in 1825, proceeded to Greece, and returned to England 1827. He wrote *Account of the newly-discovered temple* (1822) *at Cadachio, in Corfu*, which was published in STUART, etc., *Antiquities*, fol., London, 1830, Supp. vol. He designed 1830 Randalls, near Leatherhead, Surrey, for N. Bland, esq.; 1834 house at Gracedieu, Leicestershire, for A. Lisle Phillips, esq.; new lodge at Dichley, for C. M. Phillips, esq., M.P., of Garendon park, with 1838 gatehouse at Garendon park; 1838-9 the residence, with 1849 the chapel, for the bishop of Ripon, Yorkshire, for the Ecclesiastical Commissioners; and 1839 gained the competition for the Nelson memorial, Trafalgar Square, which was carried out 1840-43 (CIVIL ENGINEER, ETC. *Journal*, ii, 280; vi, 410, the scaffolding, etc.; BUILDER *Journal*, viii, 174), and completed 1846-9. In 1843 he rebuilt S. Leonard's church, Bromley-by-Bow, ILLUSTRATED LONDON NEWS, iii, 341; 1844 designed S. Bartholomew-the-Less church with schools, Suffolk Street, Mile End; *idem*, iv, 364; 1845-6 Beau Manor park, Leicestershire, for W. P. Herrick, esq.; made restorations at Ripon minster, Yorkshire, including Norman groining to the transepts; designed 1846 Rischolme hall, adapted and enlarged for the bishop of Lincoln; 1849 Holy Trinity Church, Hoxton; and Meanwood church, near Leeds, Yorkshire, for the misses Beckett; I. L. NEWS, xv, 252. Railton held the appointment of architect to the Ecclesiastical commissioners from 1838 to 30 Nov. 1848. In 1836, he submitted a design in competition for rebuilding the houses of parliament; and died 13 Oct. 1877.

RAILWAY. A road in which wood or iron tracks or rails are laid to facilitate the motion of wheeled carriages. Perhaps the earliest railway act is one for a waggon-way for conveying coals to Leeds, 31 George II, 1758. A list of 124 lines since 1801, in Great Britain and Ireland up to 1840, is given in PENNY CYCLOPÆDIA.

TREDGOLD, *Practical Treatise on Railroads*, etc., 1825; BREES, *Railway Practice*, four ser., 4to., London, 1837-47; WOOD, *Practical Treatise on Railroads*, etc., 3rd edit., 1838; LECOUNT, *Treatise on Railways*, in ENCYC. BRITANNICA, before 1841; HAHN AND HOSKING, *Bridges*, 8vo., London, 1843; DEMPSEY, *Practical Railway Engineer*, etc., 1847, and *Railway Stations*, etc., 1856; CHABAT, *Bâtimens des Chemins de fer*, 100 pl., fol., Paris, 1862; PERDONNET ET POLONCEAU, continued by PERDONNET ET FLACHAT, *Nouveau Portfeuille de l'Engénieur des Chemins de*

fer, 3 vols., 170 pl., fol., Paris, 1856; 180 pl., 1867-8; CLUYSENAAR, *Bâtimens des Stations*, etc., fol, Brux., 1869; INSTITUTION OF CIVIL ENGINEERS, *Transactions;* NOUVELLES ANNALES DE CONSTRUCTION, for August 1855, gives a very good list of publications. BUILDER *Journal*, 1857, *History*, xv, 381. *Examples of Railway Making*, 8vo. (Weale), 1843. SMILES, *Lives of the Engineers*, 8vo., London, 1861. DEWEY, *Life of Joseph Locke*, 8vo., 1862. HELPS, *Life of Brassey*, 8vo., 1872. 2. 14.

RAILWAY PLATFORM, (Fr. *marquise*, the lean-to roof over), in ANNALES, ETC., i, 27, iii, 25-6. BREES, 4th ser. RAILWAY TOOLS, in BREES, ser. iii, pl. 8. RAILWAY WORKSHOPS, in CIVIL ENGINEER, ETC., *Journal*, 1851, xiv, 148.

RAIMOND; see RAYMOND.

RAIMONDO (ELISEO), designed 1496 his own superb marble residence, near the porta S. Luca, now known as palazzo Crotti; and another house in the contrada Rebuello, both at Cremona. ZAIST, *Notizie*, 4to., Cremona, 1774, i, 91. GRASSELLI, *Abecedario*, 8vo., Milan, 1827, p. 215.

RAIMUNDO; see RAYMUNDO (EL MAESTRO).

RAINALDI (ADRIANO), of Rome, also a painter, had three sons, TOLOMEO, GIAMBATTISTA, and GIROLAMO. The *first*, probably a disciple of Michael Angelo, settled at Milan, where he held the office of architect to the royal house, and of fortifications. He had two sons, DOMIZIO and GIOVANNI LEO, who, following their paternal profession, were called TOLOMEI, succeeded to the offices of their father, and erected many fortresses in the city, in the States, and in the Valtellina. The *second* son was employed on the fortifications of Ferrara, in the works of the ponte Felice at Borghetto, on the fountain at Veletri, and on other public conduits; erected a number of buildings at Rome, where he married, and had a son, DOMENICO, painter and architect.

RAINALDI (GIROLAMO), the *third* son, born 1570 at Rome, became a pupil of D. Fontana, who entrusted to him the design and carrying out of the church at Montalto, erected for pope Sixtus V (1585-90). After the death (1601) of G. della Porta, he raised the second story of the Campidoglio at Rome; FERRERIO, *Palazzi*, fol., Rome (1655), pl. 51; LETAROUILLY, *Rome Moderne*, fol., Paris, 1825-60, p. 726, pl. 352; designed *il porto* or the harbour at Fano, for pope Paul V (1605-21); at Frascati about 1606 the villa Taverna, for the cardinal Scipio Borghese; PERCIER ET FONTAINE, *Maisons de Plaisances*, fol., Paris, 1824, pl. 55-6; embellished the gardens of the villa Borghese; *idem*, pl. 21-6; and at the villa Farnesiana the aviaries in the gardens are ascribed to him; *idem*, pl. 30-32; and by LET., p. 552, pl. 264-5; 1610 the whole of the exterior and interior decorations at S. Peter's, for the canonisation of S. Carlo Borromeo; 1620 *cir.*, at Terni over the river Nera, the bridge of 17 semi-arches, each 131 ft. 3 ins. span, 32 ft. wide, and 2592 ft. long (MILIZIA says of one large arch); 1621 the church and monastery of Sta. Teresa dei padri Scalzi at Caprarola (also attributed to the younger M. Lunghi); 1623 the residence for the Jesuits, piazza del Gesù at Rome; LET., p. 178, pl. 41; p. 419, pl. 198; and their college of Sta. Lucia at Bologna, with 1623 the church there (the façade 1700-30 by F. Angelini); and 1628 commenced the exterior of Le Acque, a church dedicated to SS. Girolamo ed Eustachio, outside that city. At Parma he designed and commenced a palace for the duke; another at Placentia; and at Modena (MILIZIA); and the two fountains in "piazza Farnese del Ser. Sr. duca di Parma"; FALDA, *Fontane*, fol., Rome (1675), i, pl. 9; 1644 the grand palazzo Panfili in piazza Navona, for pope Innocent X (1644-55), who is said to have spoiled the work; FERRERIO, *Pal.*, i, pl. 9; and *cir.* 1645 commenced the church of Sant' Agnese adjoining, which was continued by his son; LET., p. 380, pl. 177; and 1647 restored the church of S. Elizabetta de' Funari.

Among other designs attributed to Rainaldi at Rome, are: the altar in the capella Paolina in Sta. Maria Maggiore; the palazzo Verospi in the Corso (also to O. Lunghi by FERRERIO, *Pal.*, pl. 93; LET., p. 160, pl. 16; BAGLIONE, 148; and PASCOLI, 513); palazzo Doria in piazza Navona, or additions (GWILT, *Notitia*); the entrance door to the palazzo (by G. della Porta) Paluzzi d'Albertoni in Campitelli (FERRERIO, *Pal.*, pl. 81); three stalls in nut-tree wood, for the Colonna family in the church of S. Giovanni in Laterano (LET., 486); the capella Spada in the church of S. Maria e S. Gregorio in Vallicella (chiesa Nuova); and a chapel in that of S. Maria della Scala. He twice visited the Chiane marshes in Tuscany, in consequence of the dispute between the grand duke and the court of Rome; and made a design *cir.* 1625 for the façade of S. Petronio at Bologna, still exhibited (not by Carlo as in MILIZIA).

He died in 1655, aged 85, and was buried in the church of Sta. Martina at Rome. 3. 12. 25. 28. 31. 42. 111.

RAINALDI (CARLO), cavaliere, born 1611 at Rome, was educated under his father, and commenced designing gardens, fountains, and such like. He succeeded his father at the church of Sta. Agnese, continuing the works up to the entablature, or the decoration with the lantern to the cupola, and the two campanili (the façade, etc., by F. Borromino); was appointed by pope Innocent X, chief of the commission to enquire into the safety of the campanile erected by G. L. Bernini at S. Peter's, which was removed though deemed safe; made several designs for another of lighter construction; and four designs and models for the piazza in front, abandoned on the death of the pope; designed the tomb of the cardinal Bonelli in the church of Sta. Maria sopra Minerva; modernised the church of the SS. Apostoli, for the cardinal Lauria, and built the chapel therein to S. Antonio de Padova, (the portico, or the church, apparently rebuilt by F. and C. Fontana); designed the façade to the church (by Carlo Milano) of Gesù e Maria at the upper end of the via del Corso, and the high altar therein; FALDA, *Nuovo Splendore*, fol., Rome, 1686, iii, pl. 8; ROSSI, *Altare*, fol., Rome (n.d.); the Servite church of Sta. Maria in via (GWILT), or completed the works begun 1594 by M. Lunghi; the high altar in S. Lorenzo in Lucina; grand chapel in Sta. Anna; 1620 two chapels and high altar in the church of the confraternità Sta. Maria del Suffragio; church of S. Sudario, though said to be rebuilt 1605; high altar in church of Sta. Maria degli Angeli; the church of S. Maria in Campitelli, for pope Alexander VII (1655-67), RUBEIS, *Insig. Rom. Templ.*, fol., Rome, 1684, pl. 55-7; the façade to S. Andrea Apostoli della Valle, dated 1615 by some (the church 1591 by P. P. Olivieri, F. Grimaldi, and C. Maderno), RUBEIS, *Insig. Rom. Templ.*, pl. 46, who, pl. 44, ascribes the church to Maderno; also the fine residence adjoining the church: the two small churches at the porta del Popolo, called Madonna de' Miracoli, and Sta. Maria del Monte Santo, or di Campo Santo, LET., 520, pl. 233; RUBEIS, *Ins.*, pl. 47; (completed by G. L. Bernini and C. Fontana); 1673 the façade to the basilica of Sta. Maria Maggiore facing the obelisk, LET., 618, pl. 304; 622, pl. 305; and the tomb of pope Clement IX (died 1670) therein, LET., p. 613, pl. 306; the *duomo* at Ronciglione; the church at Monteporzio; the greater portion of the gardens and decorations, as the three great fountains in stucco, at the villa Mondragone at Frascati, for the Borghese family; PERCIER, etc, *Maisons des Plaisances*, fol., Paris, 1824, pl. 52-4; LET., p. 376, pl. 175; FALDA, *Giardini*, fol., Rome (before 1695), pl. 11-2; FALDA, *Fontane*, fol., Rome (1675), iii, pl. 9-10; the gardens and decorations at the villa Pinciana (according to MILIZIA); and for the duke of Parma in the Campo Vaccino, FALDA, *Giardini*, pl. 8-9 (or pl. 11-12); FALDA, *Fontane*, iii, pl. 8; the palazzo dell' academia di Francia, first erected for the duke de Nevers (a chief work); and at Fano 1685-6 the church to the college of the Jesuits. He furnished designs for the duke of Savoy and the king of France, who rewarded him handsomely; that for the façade to the church of S. Petronio at Bologna, attributed to him, is by his father; and his design 1690 for the façade of the church of S. Carlo, in the via del Corso at Rome, was rejected; LET., p. 472.

Amongst his other designs at Rome are: the high altar in the church of Sta. Maria della Scala; the chapel or altar of S. Biagio in that of S. Carlo alli Catinari; chapel and altar in that of S.

Girolamo della Carità; capella maggiore in that of S. Sebastiano; Valentino, and S. Anna de' Funari; with the tombs of cardinal Bellarmin in the chiesa del Gesù, and of cardinal Consalvi in that of S. Marcello. Rainaldi died 8 Feb. 1691, after a long illness, aged 80 (and not in 1641 as stated by Milizia and others). 3. 12. 25. 31. 32. 34. 42. 111.

RAINALDI; see Rinaldi of S. Petersburg.

RAINALDUS of Pisa; see Pisano (R. da). 25.

RAINFALL. The mean annual quantity of rain falling during an average of years in the British islands appears to be about 36 in.; the average in London is about 25 ins.; in the driest parts it is about 18 ins.: and in the mountains of Cumberland, 189 ins. In and around London in 1859 it was 27.225 ins.; in both 1877 and 1878 it slightly exceeded 30 ins. The proportions due to seasons are: winter, 5.868; spring, 4.813; summer, 6.682; and autumn, 7.441 = 24.804; Builder *Journal*, 1860, xviii, 193. July is not now a month of maximum; April takes the place of February and May as the month of maximum. The height at which the fall is taken is important. Dr. Heberden found the annual fall, as recorded by similar gauges, to be at the top of Westminster abbey, 12.099 ins.; on the top of a house close by of less altitude, 18.139; and on the ground, 22.608 ins.; Builder *Journal*, xxiii, 622; xxxvii, 758; xviii, 229; xxxvii, 1056; Building News *Journal*, xxv, 338; xxxv, 170.

The maximum rate of fall may be taken at 1 in. per hour. On 6 Sept. 1865, the fall (in England?) was 2.682 in somewhat over three hours. On 10 April 1872 fell in London 2 ins. (at Greenwich 3 ins.) in about nineteen hours. Between midnight of 25 July 1867 and 10 o'clock in the morning, 3.18 ins. fell, an amount unprecedently large for London; thus $\frac{1}{8}$ of the average rainfall for a whole year fell in ten hours; Builder *Journal*, xxiii, 622; xxxvi, 395; xxxiv, 52.

An "inch of rain" means a gallon of water spread over a surface of nearly two square feet, or a fall of about 100 tons upon an acre (Symons). An "inch of rain" falling on an acre is equivalent to 22,622 gallons (Denton), or $14\frac{1}{2}$ million gallons per square mile; this forms the basis of all calculations respecting water-supply (Symons). To calculate the quantity of water that will accumulate over a given area, multiply the inches of rainfall by 2,323,200 which will give the cube feet per square mile. If by $14\frac{1}{2}$, it will equal millions of gallons per square mile. If by 3,630, it will equal cube feet per acre; Molesworth, *Pocket Book of Formulæ*, 12mo., London, 1865, p. 223.

Homersham, *Report on the Supply of Surplus Water to Manchester, etc., and Annual depth of Rain falling in and around*, 1832-47, 8vo., 1848; and *Tables*, reprinted in Civil Engineer, etc., *Journal*, xi, 177; and *Depth of Rain which falls in the same localities at different Altitudes*, xi, 349-50. Simmonds, *On the Rainfall of various Countries*, read at British Association, Glasgow, 1855, printed in C. E. *J.*, 1855, xviii, 378, 419. Symons, *British Rainfall*, 8vo., London, 1862, and later; and *Rain; how, when, where, why it is measured*, 8vo., London, 1867; and *Rainfall and its Relation to Civilised Life*, in Institution of Surveyors, *Transactions*, ix, 127, which describes, *Rain Gauges*, *Rules for observers*, *Summaries experience* up to 1877; and *Hydrographical Map of the British Isles*. Latham, *Supply of Water to Towns*, in C. E. *J.*, 1865, xxx, 19-24; 41-47. Denton, *Advantage of a Daily Register of the Rainfall throughout the United Kingdom*, 4to., 1861; and Society of Arts *Journal*, Jan. 15, 1858; and *The Storage of Water*, etc., 8vo., 1874; reviewed in Daily Telegraph *Newspaper*, Aug. 27; and in Building News *Journal*, xxvii, 279, 331, 738.

Discharges of Rainfall in London, B. *J.*, 1878, xxxvi, 395; *Rainfall and Embankments*, B. N. *J.*, 1875, xxix, 77, 155; also 1866, xiii, 208; 1878, xxxv, 169. Institution of Civil Engineers, *Transactions*, 1848, gives *Evaporation and Absorption*, etc., vii, 275-6; *Rainfall in London from* 1820 *to* 1829, xiii, 113-5; *Rainfall and Percolation at Nash Mills*, 1833-60, xx, 222; *Rainfall in England*, xxi, 100. Registrar-General's *quarterly returns* from about fifty places. Meteorological Journal. Rivers' Pollution Commission, *Sixth Report*. Fairbairn, *Mills and Millwork*, 4th edit., 8vo., London, 1878. Manchester Philosophical Society, *Transactions, Report of Rainfall, or Meteorology for ten years*.

Rain Gauge; Building News *Journal*, 1866, xiii, 543, 770.

RAINUCCIO (Giacomo); see Ranuccio (G).

RAINWATER. The water collected from showers possesses wholesome qualities, because it consists of the lightest and most subtle particles of all springs, which, cleansed by the action of the air, and loosened by the tempests, descend upon the earth; Vitruvius, viii, ch. 2, 3, 4, and 5, on *Nature and Qualities of Water*. It is pure and soft in country places; river water is generally softer than spring-water, but contains more organic matter both in suspension and in solution. The water of lakes is usually very pure. Rain-water slowly dissolves lead. It is better for steam-boilers than hard water as it does not form a crust thereon so readily. Hopkins, *On the Power Displayed by Condensation of Vapour in the Atmosphere*, in Civil Engineer, etc., *Journal*, 1856, xix, 49-52; and *General and Systematic Meteorological Inquiries*, p. 127-9; and *Winds and Rain of Central America*, xx, 351-4. Baxendell, *On the Theory of Rain, idem*, 1860, xxiii, 167-8. Anon., *Atmospheric Changes which Produce Wind and Rain* (Weale), London, 1854. Parry, *Water: its Composition, Collection, and Distribution*, London, 1881. Water. Water-supply. Artesian well. Well.

RAIN-WATER CISTERN and TANK. The former, as similar to the receptacle provided to contain fresh water, is described s. v. cistern, and may require only the addition that it is often formed of painted iron for common outside purposes, or of galvanised iron when in connection with a hot-water apparatus, or its supply to the upper part of a house. Wrought-iron tanks and cisterns are also constructed of sizes in relation to the supply. Such cisterns when placed in a roof to collect rain-water from it, are often the cause of great damage to the interior of a house by the waste-pipe or overflow not being sufficiently large; an allowance of 1 in. in depth (per square foot of area?) per hour, is stated to be required; Building News *Journal*, 1870, xviii, 425.

The rain-water tank may contain half a cubic foot of water for each square foot of roof area; the minimum being 2 in. in depth, or $\frac{1}{8}$ cube ft. to every square foot of roof area, the quantity required per head per diem being taken at from 10 for domestic purposes to 20 or 30 gallons; as much as 56 gallons has also been named. Provision may be made for six weeks' consumption in summer. Symons, *Transactions* of Institution of Surveyors, ix, 136, gives a calculation of the water to be collected from the tiled roofs of an Elizabethan house, 110 ft. by 30 ft. on plan; mean annual rainfall 36 ins., and estimates it at 46,513 gallons per annum, or only 127 gallons per diem. If all the water falling on a roof could be collected, a rainfall of 20 ins. would give 93.4 gallons per square yard per ann., while 25 ins. would give 117 gallons. The yield from a slated roof is about 10 per cent. greater than from tiles, and allowance should be made for heavy rains occurring when the tank is full—say $12\frac{1}{2}$ per cent. Wallis, *Table of daily yield of water from tiled roofs*, B. N. *J.*, 1879, xxxvii, 563; 695.

The *tank* should be formed with a separate filter-tank to receive the water in the first instance, wherein all solid matter would be deposited. Buck's patent percolator prevents the first portion of the rainfall (which brings down impurities from the roofs) passing into the storing tank, and is a useful appliance. The overflow should be disconnected from any soil drainage, be well trapped, and be protected by wire gratings from affording vermin access to the tank. The gutters and cistern heads of the collecting roof should also have wire gratings as protection from leaves, etc. The tank should be deep rather than wide, be sunk sufficiently below the surface for protection from frost and changes of temperature, and have a manhole for access for cleaning. Building News *Journal*, 1869, xvi, 123, 145; 1874, xxvii, 358, 417, 711; 1875, xxviii, 194, 222, 305; xxix, 576, 602; 1879, xxxvi, 215. Wallis, *Rain collected from roofs considered*

as a domestic water-supply, in BUILDER *Journal*, 1879, xxxvii, 1211; and in B. N. *J.*, xxxvii, 518. *Detached Essays*, Aqueduct. VIOLLET LE DUC, *Dict. de l'Arch.*, s. v. Citerne. VITRUVIUS, lib. viii. DE RAU, *De Fontibus, Puteis et Cisternis Veterum Hebræorum*. PISCINA. RESERVOIR. STORAGE OF WATER. TANK.

RAIN-WATER PIPE. A pipe or tube, circular or square in section, formerly of lead, but now of cast-iron; and in common work of zinc, usually placed against the exterior of a building to carry off the rain-water from the gutter of the roof. A square wood pipe formerly used in cottages and country buildings, is usually called a "trunk". HURST, in BUILDER *Journal*, 1860, xviii, 534, gives the formula $q = 5\sqrt{d^5}$; d being diameter of pipe in decimals of a foot, and q the quantity of water discharged in cubic feet per second, as more accurate than the previous formula used.

In ancient times, terra-cotta tubes were used; thus at the so-called temple of Venus Genitrix, at Baiæ, they still remain within the coupled pilasters at the angles of the octagon. In the amphitheatres, the rain-water conduits were merely pierced through the masonry. VIOLLET LE DUC, *Dict. de l'Arch.*, s. v. Conduite, describes the stone conduits used at Vezelay and elsewhere, to convey the rain-water collected from the roofs down into the cisterns. In Normandy and Picardy, rain-water conduits were as early as 1230, and at the tower of London in 1241, adopted in place of gargoyles. At Bayeux the water is carried off by lead pipes buried in the buttresses; and similar arrangements are provided at Sées, Nevers, and other places. The château Josselin, in Bretagne, XV cent., has many down pipes with gargoyles, and large heads of animals as shoes at some height above the ground; Noël after Vauzelles, reduced in *l'Univers Pittoresque*, France, 8vo., 1845, pl. 439. Square rain-water pipes were used in England in the XIV cent.; in XV cent. at Kettering church, Northamptonshire (BILLINGS, *Ket. Ch.*, 4to., London, 1843); and at King's College chapel, Cambridge. LYDGATE, *Troye*, Marshe's edit., 1555, lxxiv, vaunts the use of pipes from the "hydrous head" to the "carrell" through grates into the ground; WILLIS, *Nomenclature*, 4to., Camb., 1844, p. 38. The Statute for rebuilding London, 1670, 22 Charles II, c. 11, required that water from the tops of the houses should be conveyed down the sides of the houses in pipes.

The heads and bands to these "standard pipes" were frequently richly decorated. A pipe, or shoot, out of the *head* provides for the discharge of water in case the pipe becomes stopped; and another at the *foot* of the pipe above ground, allows of the discharge of water on to the surface, in case of the stoppage of the drain connected with the pipe; as at Great Yarmouth church. J. Taylor patented 1863 an arrangement by which the bottom length of the pipe could be slid upwards, and any obstruction at or near the bottom of the pipe removed; BUILDER *Journal*, 1863, xxi, 885; 1865, xxiii, 121. Particulars of cast-iron rain-water pipes, heads, shoes, bends, elbows, etc., may be found in the trade lists and illustrated catalogues of MacFarlane, G. Smith and co., and other iron founders. Brackets or bands supporting the lengths of pipes should be fixed about 3 ft. apart. The staple (Fr. *gache*) in France is made to open and shut, so that a length if cracked can be taken out and replaced.

Rain-water pipes are often used as drain pipes from upper water-closets, and as ventilators to drains; and where buildings cover a large surface, as railway stations, sheds, etc., and as the great exhibitions, the iron columns carrying the roof are used as down pipes from the gutters, a system requiring careful precautions to regulate the size, and to prevent stoppage in them, or in the drains leading from them.

RAISED WORK; see ANAGLYPHIC; and EMBOSSED WORK.

RAISER. "A board set on edge under the foreside of a step", and now called a "riser"; MOXON, *Mech. Exercises*, 1694, p. 167. 4.

RAISING *a building*; at San Francisco, BUILDER *Journal*, 1854, xii, 576. At Boston, *idem*, 1860, xviii, 836. HOUNSLOW, *Description of the Method of Raising Buildings by Screws, in Canada and the United States*, in *Papers* of the Corps of Royal Engineers, 4to, London, 1843, vi, 186. HOUSE MOVING.

Building materials, by inclined planes. MENNIE, in *Papers* of Corps of Royal Engineers, 8vo., London, 1855, new ser., iv, 65. HOIST. LIFT. MOVING.

Obelisk, etc.; of Luxor, at Paris; at Rome; at Seringapatam; see OBELISK: the "Cleopatra needle" in London, 1879. RICARD DE MONTFERRAND, *Colonne à S. Petersbourg*, fol., Paris, 1836; and *Eglise Cath. de S. Isaac*, fol., Paris, 1845. 14.

Roof; 18 ft., at the Oratory Catholic church, Brompton, described in BUILDING NEWS *Journal*, 1858, iv, 696. Of a goods' warehouse on the Great Northern railway at King's Cross, 300 ft. by 80 ft., *idem*, 1875, xxix, 602.

Spire; 80 ft. high, of the church of the Nativity, in Spring Garden, co. Philadelphia, by N. le Brun, is described in the American *Franklin Journal*; reprinted in CIVIL ENGINEER, *etc., Journal*, 1846, ix, 41.

Statue. Colonne Vendome at Paris; ALLGEMEINE BAUZEITUNG, 1838, pl. 213.

Stone. The cover to the mausoleum of Theodoric at Ravenna.

Wall to perpendicular; see PERPENDICULAR.

Weight; see LEWIS.

RAISING-PIECE. An old term, still used in the north of England, for a WALL-PLATE to a beam of a roof; and also for the head to the posts or puncheons of a timber framework. MOXON, *Mech. Exer.* (Carpentry), 4to., London, 1694, p. 133; 139; 143; 167. PRICKE, *Art of Fair Building*, fol., London, 1670, pl. 46. LOUDON, *Cottage, etc., Arch.*, 1833, p. 983; 990. "Raising or reisin-piece" occurs in HUNT, *Tudor Arch.*, 4to., London, 1836, p. 182; from HOLINSHED, Description of Henry VIII's lodging near Guisnes, in 12th year of his reign. "Raison, reason, and reson", occur in NEVE, *Dict.*, 1736. 1. 4. 16.

RAISON; see RAISING-PIECE. 4.

RAJAS (PADRE PABLO ALBINIANO DE), designed the parish church (Doric order) at Liria, built by M. de Orinda (died Dec. 1655); the façade by T. L. Esteve. 66.

RAKE. A slope or inclination, as of a roof, pediment, and such like. CUTTINGS.

RAKER. An implement used in mixing lime and hair for plaster; or in making parget.

RAKHAIN; see ARACAN.

RAKING. A term applied to any member whose arisses lie inclined to the horizon; as a raking cornice, etc.

RAKING ARCH. An arch whose imposts are not on the same level. RAMPANT ARCH.

RAKING BACK; see JUMP.

RAKING MOULDING. The rules to find the lines for the profile of such a moulding are given in most books on *Carpentry*, etc.

RAKING PLATE, for housing a step in a partition (Fr. *sablière de chambre*).

RALEIGH. A city of Wake co., the capital of the county and state of North Carolina, in the United States, situated on the river Neuse. The site was selected 1788 as the seat of government; laid out 1792; and incorporated 1794 as a city. The four principal streets are 99 ft. wide, the others 66 ft. The state house (burnt 1831) was rebuilt of "granite", or a hard cream-coloured stone with quartz veins, after the Parthenon at Athens; it is 140 ft. by 160 ft. (usually called 90 ft. by 100 ft.; and 90 ft. by 166 ft.); and 97 ft. 6 ins. high; the columns 5¼ ft. diam., are 30 ft. high, and it has a dome. "The design by I. Town was laid aside and the whole work designed 1834-38, by David Paton, some years since of Edinburgh;" CIVIL ENGINEER, ETC., *Journal*, 1837, i, 52; iii, 395, giving a full description of the edifice; ARCHITECT *Journal*, 1850, ii, 124. A court-house and post office, of granite, was being erected 1874. RIPLEY AND DANA, *New Amer. Cycl.*, 8vo., New York, 1875. 50.

RALPH, or RANULPH, FLAMBARD, bishop of Durham (1099-1128), continued the erection of the cathedral commenced by his predecessor, W. DE KARILEPHO. He also erected at DURHAM, the

remarkable Framwellgate bridge of two arches, 82 ft. and 87 ft. span respectively, and about 17 ft. wide, across the Wear; and founded Norham castle; with other works. SURTEES, *Hist. of Durham*, fol., 1816-40, i, xx.

RAM; see HYDRAULIC RAM or water ram. BUILDING NEWS *Journal*, 1875, xxviii, 340.

RAM. The weight used in PILE DRIVING; see MONKEY.

RAM (Fr. *bélier*). A sacred animal principally adored in Egypt, at Thebes, Hypselis, Saïs, and Libyan portions. It was consecrated to Ammon, king of the Gods, and to Chnouphis; as the crio-sphinx, having the head of a ram with the body of a lion, in the avenue to the temple of Khons at Karnak; BELZONI, *Narrative of the Operations*, etc., 4to., London, 1821-2, p. 552. GAILHABAUD, *Mons.*, 4to., Paris, 1842-52, i. Persia was represented by a ram; when at the head of his army, the king wore a ram's head of gold. In the museo nationale at Palermo, is one (restored) of two ancient bronze rams, in a reclining attitude, brought to Syracuse from Constantinople in XI cent. by George Maniaces, the Byzantine general; the other was demolished in 1848.

The head is often seen in Roman work, as for sustaining festoons; TEXIER, *Asie Mineure*, Aizani, fol., Paris, 1839-40, pl. 35. It appears in the façade of the cathedral at Reggio; and was occasionally introduced in mediæval sculpture as symbolical of lust. The horn has been introduced as the volute of the capital of the Ionic order; HORN. 28.

RAMBAE or CUENCA, in Ecuador in South America.

RAMELSTONE. The chips and useless stone in a quarry or mason's yard; from ramell, meaning rubbish. SURTEES SOCIETY, *Fabric rolls of York Cath.*, 8vo., Durham, 1859, pp. 51, 52, 54, 351, dating 1433. GALLET.

RAMESEIUM; see Karnak in THEBES.

RAMISSERAM or RAMISERUM. A town in the island of Paumben, between Hindostan and Ceylon. A thousand houses mostly well built; a magnificent Brahmin temple to Siva and Rama, constructed in part of vast granite blocks, having a tower 100 ft. high and exceedingly richly carved colonnades, 447 ft. and 690 ft. long and from 20 ft. to 30 ft. wide; which with its appurtenances almost entirely covers an area of 868 ft. by 672 ft; a small shrine existed from about XI or XII cent., the chief portion was however erected by the rajas of Ramnad from about 1550-1720. The four gopuras, one on each face, are wholly of stone, probably the only exception in India; the western one only is completed. SALT, *Views in India*, fol., London, 1809. GEOGRAPHICAL SOCIETY OF BOMBAY, *Journal*, vii, gives a plan copied in FERGUSSON, *Indian Architecture*, 8vo., London, 1876, p. 355-9.

RAMMER (Lat. *fistuca*). A heavy instrument varying in shape and size for the purpose for which it is intended to be used. MAUL; PAVIOUR; PUNNER; BEETLE; MONKEY. BREES, *Railway Practice*, 4to., London, 1847, ser. 3, pl. 8-10.

RAMNAGHUR, formerly RAMNUGGER; see BENARES.

RAMON (DON PEDRO), mason, in 1393 was working at the exchange at Palma, in the island of Majorca, which was begun to be rebuilt by G. Sagrera about 1426. 66.

RAMON (PEDRO), a Fleming, built 1585 the brick wall 18 ft. to 20 ft. high which encloses the town of Lima in Peru; it was repaired in 1807 but again 1829 became dilapidated. 66.

RAMOS (DON ANTONIO); see BADA (J.)

RAMP. The concavity on the upper side of a handrail formed over the risers, or over a half or quarter pace. Also any concave form, as in a coping, where a higher is to be joined by a continued line to a lower body. It is the reverse of a KNEE. 1. 2.

The Fr. *rampe d'escalier* is applied to what in English is called a "flight" in a staircase. BLONDEL, *Cours*, 8vo., Paris, 1773, iv, 289. 5. 25.

RAMP. In fortification or earthwork; a gentle slope up which heavy weights can be drawn or let down; or to facilitate communication without steps. 2.

RAMPANT ARCH. An arch where one of its springing walls rises higher than the others; it is most used in pediments and roofs. RAKING ARCH. 1. 2. 19.

RAMPART. A mossy bank or elevation of earth or other material, raised for the purpose of covering a place from the direct fire of the enemy. It is formed into bastions, curtains etc. POMŒRIUM.

RAMPER. A term in the marshes of Lincolnshire for a high road, derived from the former raised bank or rampart, which has become a parish highway.

RAMSEY (WILLIAM DE), was appointed 1336 chief mason to the king at the tower of London and chief overseer of the king's works in all his castles south of the Trent, at a salary of 12d. per day and a robe yearly. MAITLAND, *London*, edit. Entick, fol., 1756, i, 152.

RAM'S HEAD. An iron lever for heaving up great stones. 4.

RANCE. A marble obtained from Hainault in Belgium, of a dingy red colour varied with veins and spots of blue and white. The six large columns of the high altar (destroyed) in the church of the Sorbonne at Paris were of this marble.

"At a grand committee, 4 Nov. 1667, it was ordered that the marble stone att the Exchaing, called rance, be forthwith equally devided, and (in regard itt will not be used again there) the city and company to remove their moityes to places where they may have occasion to use that sort of stone"; *Extracts from Records*, 1564-1825, fol., London (1839), p. 80.

RANCE. A term used in Scotland for a prop or shore. 1.

RANCHAD, Ronchard, Ronchart, and Bonchard, perhaps properly ROVEHEAD (. . . . .).

RANCONVAL or RANGUEVEAUX (HENRI DE BOUQUENON, seigneur de), was 1444 architect to the city of Metz, where he directed certain works of fortification; restored the pont de la porte des Allemands; 1445 commenced two towers at the same gate, as stated in an inscription only correctly given in LANCE, *Dict. Biog.*, 1872; 1472 erected a mill, and other works.

RANCONVAL (JEAN DE), his son, repaired 1468 the roof of Metz cathedral; 1478-83 constructed the tour de Mutte; 1480 repaired the porte S. Thiébault and porte des Allemands; and commenced 10 May 1480 the church of S. Symphorien and completed it. The choir of Metz cathedral has been attributed to him without sufficient grounds. BÉGIN, *Cath. de Metz*, 8vo., 1842. LANCE, *Dict. Biog.*, 1872.

RANDALL (JAMES), born 1782, exhibited at the Royal Academy of Arts from 1798 to 1813 or later; 1808 a conservatory for col. E. Agar, M.P.; 1809, bath for J. Colingridge at Sunbury; and 1813 "gallery as it was intended to have been erected in the garden of Leicester Square by B. West, P.R.A." He published *Designs for Casinos, Mansions, etc., in Grecian, Gothic, and Castle styles*, 34 pl., fol., 1806; and *A philosophical enquiry on the cause, with directions to cure, the Dry Rot in Buildings*, 8vo., 1807.

RANDOM COURSED WORK. Stone walling, where the courses are not continued of the same sized stones; thus a length of one course of stone may be finished by two courses of stone of less height but together equal to that of the first length. It is called HACKING in Scotland.

RANDOM TOOLING, called "droving" in Scotland. BOASTER. DROVED. 1. 2.

RANDOM WORK. Stones fitted together but not bedded on horizontal beds. Such as the opus INCERTUM of the ancients.

RANGE. A line let fall from one obtuse angle to the opposite side of a quarry of glass.

RANGE or RANGING. The side of any work that runs straight without breaking into angles is said to "run range". The term is also applied to the edges of a number of bodies when standing in a given plane. 1. 4.

RANGE. The name given to the apparatus by which cooking is done, as in a KITCHEN. It consists of the old "open" range; the "close" range, more usually called the "Leamington cooking-stove"; and the "kitchener". A good description is

given in BUILDING NEWS *Journal*, 1870, xix, 29; 114. In fixing these close ranges, a source of danger from fire, or damage, to the chimney jambs, occurs from the space left behind the side plates, etc.; this has been recommended to be "puttied up" in place of cementing or other similar remedy, *idem*, 1877, xxxiii, 193.

RANGER (WILLIAM), builder of Brighton, patented before 1837 an ARTIFICIAL or CONCRETE STONE, which was little more than a common concrete mixed with the strongest ground lime, with rather more care than usual, faced with lime and sand, and moulded and set with *hot* water. Its application to the building of docks and river walls at Chatham and Woolwich, is noted by DENISON, in *Papers* of the CORPS OF ROYAL ENGINEERS, 1838, and reprinted in CIVIL ENGINEER, ETC., *Journal*, i, 378; also REID, relating its use at the Brighton sea wall, in vol. i of *Papers:* and also vi, 371 of *Journal*. ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Transactions*, 4to., London, 1835, p. 27; 42. A school at Lee, on the model of the Propylæa at Athens, was erected of this concrete by G. L. Taylor; and a Gothic church at Brighton 1824 by its inventor. PASLEY, *Limes, Cements, etc.*, 8vo., London, 1838; and 1847. CONCRETE.

RANGING. Equalising or levelling a surface. BACKING of a rib or rafter. FIRRING. EDGING.

RANGING LINE. An implement used in setting out excavations, as by navigators, bricklayers, gardeners, and such like. LINE.

RANGING OF GLASS. The cutting of it into breadths.

RANGOON or RANGÛN. A town in Burmah situated on an eastern branch of the river Irrawaddy; and built by Alompra in 1755. The most conspicuous edifice is the Buddhist temple called Shoo-da-gon or Shoëdagong, an eight-storied pagoda said to be 278 ft. high, on a terraced hill, surrounded by smaller temples from 30 ft. to 200 or more ft. high. In 1852 the old town was a heap of ruins, as a new one had been formed 1¼ miles from the river; the great temple formed part of its defences, and where most of the fighting took place.

Eighteen coloured views in Rangoon, fol. (? 1825, G. Moore, draughtsman). SYMES, *Embassy*, 12mo., Edinb., 1827. SNODGRASS, *Narrative of the Burmese War*, 1824-26, 8vo., London, 1827. CRAWFURD, *Embassy to Ava*, 8vo., 1827. W. F. LAURIE, *Second Burmese War*, 1852, 8vo., London, 1853. W. H. MARSHALL, *Four years in B.*, London, 1860. FERGUSSON, *Indian, etc., Architecture*, 8vo., London, 1876, p. 622, gives a view of the temple, as does also ILLUSTRATED LONDON NEWS, 1852, July, xxi, 52. HOUGH, *Account of the great bell*, in *Asiatic Researches*, xiv, 270. 14. 50.

RANSOME'S ARTIFICIAL STONE. A process patented 1844 for manufacturing artificial stone for grinding and other purposes, by cementing broken or pulverized stone, such as Burr stone, Bath stone, granite, sand, etc., with a solution of silica in caustic alkali; as well as for moulding it under pressure; CIVIL ENGINEER, ETC., *Journal*, 1844, viii, 169; xi, 61, 90; reprinted from INST. CIVIL ENGINEERS, *Transactions*, vii, 57-68. Improvements in the method of manufacture are described in the same *Journal*, 1854, xvii, 335; 1855, xviii, 393-4; 1857, xx, 235: also INST. OF BRIT. ARCH., *Sess. Papers*, 1860-61, p. 151 and 178; and 1862-63, p. 145; 150. 2 in. cubes of this "imperishable siliceous stone" bore a pressure of 20 to 22 tons, equal to 600-780 tons per square foot. Taking its resistance to crushing as 100, the equivalents of natural stones are Darley Dale 81; Portland 33; Aubigny 31; Bath 13; and Caen 12. The resistance to a transverse strain is greater than that of Hard York or Park Spring; BUILDER *Journal*, 1860, xviii, 261; xx, 393; and *Trans.*, I. C. E., above quoted. The "patent concrete stone" was used in 1868 for the enriched screens in the galleries around the inner court of the India office, Downing Street; B. N. *J.*, xv, 248. Other applications, the factory, and the strength of the material, are described in B. N. *J.*, xxi, 363; xxii, 309; xxiii, 138-40; and B. *J.*, 1879, xxxvii, 1074. Besides architectural ornaments, filtering slabs capable of filtering from 100 to 200 gallons of water per superficial foot per day, are made of this material.

RANSOME'S INDURATING PROCESS. A process patented in 1856 for preserving natural or artificial stone and other building materials. The stone to be preserved having been first well cleaned down, a solution of silicate of potash is applied by a brush, followed by a solution of chloride of calcium; the lime combines with the silica and forms an insoluble silicate of lime in the pores of the stone, while the chlorine combining with the soda forms the soluble chloride of sodium, at once removed by water. C. E. *J.*, 1857, xx, 235. ROYAL INSTITUTE OF BRITISH ARCHITECTS, *Sessional Papers*, 1856-57, p. 74-6; and 1862-63, p. 146; 151. B. *J.*, xvi, 646; and xvii, 228. B. N. *J.*, 1874, xxvi, 198, notices the early use of silica by Ransome.

A "patent cement", and an "imperishable cure for damp walls", are also put forward by Ransome.

RANULPH; see RALPH FLAMBARD.

RANVILLE STONE; see CAEN and publications referred to; CALVADOS; COURSEULLES; DUNDRY.

RAOUL ROCHETTE (DÉSIRÉ), born 9 March 1789 at S. Arnaud, in France, an eminent archæologist, and who occupied the post in the Académie des Beaux Arts held by Q. de Quincy. He published *Antiquités Grecques du Bosphore Cimmérien*, 8vo., Paris, 1822; *Monumens inédits d'Antiquité*, fol., Paris, 1827-33; with J. BOUCHET, *Pompéi, Choix d'édifices inédits*, fol., Paris, 1828-30; also *La Villa Pia des jardins du Vatican*, fol., Paris, 1837; *Peinture antiques inédites*, 4to., Paris, 1836; *Cours d'Archéologie*, 1828 and 1836, and translated by WESTROPP, 8vo., London, 1854; *Lettres Archéologiques sur la Peinture des Grecs*, 8vo., Paris, 1840; and *Choix de Peintures de Pompéi*, fol., Paris, 1844-46. He died 6 July 1854. 14.

RAPHAELESQUE STYLE of ornament, called GROTESQUE by the Italians of XVI cent., from *grotto*, a word applied to the antique subterranean chambers, which about that period were cleared of *débris*. On the walls and ceilings were found the fresco decorations, the study of which revolutionised in so short a time the decorative art, and established that style which is recognised in the works of Raffaello Sanzio da Urbino, his predecessors and his scholars—Pinturicchio from 1500; B. Bonfigli; P. Perugino; B. Peruzzi; Polidoro; Morta da Feltro; G. da Udine; Gio. Francesco; Pierino del Vaga; Giulio Pippi Romano, etc. POYNTER, *Arabesque decorations, particularly those of the Vatican*, in CIVIL ENGINEER, *etc., Journal*, 1843, vi, 5-7. ADAMS, *Polychromatic Ornament of Italy*, fol., London (n.d.) PAPWORTH, *Specimens of Decoration in Italian styl.*, 4to., London, 1844. GRUNER, *Fresco Decorations; Stuccoes of Churches and Palaces*, fol., London, 1844: and other works s. v. ORNAMENT. FRENCH ARCHITECTURE (p. 95-6).

RAREFACTION. The act by which a body is brought to possess more room, or to appear under a larger bulk without accession of new matter; heat being a prime agent, as in the effective use of gunpowder and other explosives, in distillation, in barometrical action, the production and expansion of steam, and direct motion as in the Montgolfier balloon. Rarefaction is also produced by exhaustion of the air-pump. DILATATION. EXPANSION. HEAT. BOYLE, *Expansion or Dilatation by Heat*. TYNDALL, *Heat considered as a mode of Motion*, 5th ed., London, 1880; and *Contributions to Molecular Physics in the Domain of Radiant Heat*, 1872. MAXWELL, *Theory of Heat*, 1871. R. R. R.

RAPHOE, or RATHOE. A town in the county of Donegal in Ireland. The cathedral dates in XI cent., and is plain; the former bishop's palace dates *temp.* Charles I. The see was united 1835 with that of Derry. 50.

RASENA. The name of the third race, as called by themselves, which occupied Etruria; also called Tyrrheni or Tyrseni by the Greeks; and Etrusci, Tusci, or Thusci by the Romans; and who are supposed to have established their power in the land about 290 years before the foundation of Rome, or 1044 before Christ. DENNIS, *Etruria*, 8vo., London, 1848, i, xxxii.

RASINAS (JUAN DE), of Burgos, 1522 visited the cathedral at Salamanca to examine the works carried out by J. Gil de Hontanon. 66.

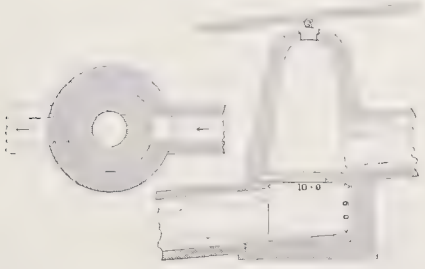
RASINAS (maestro PEDRO), was nephew and pupil of S. de Oira, and on whose death 1542 he continued the design of the great chapel in the Prænonstratensian monastery of N. S. de la Vid, and built the cloisters, dormitories, and other offices; and 1547 constructed the great bridge of 12 arches over the river Duero near thereto, which were all approved by four architects of Burgos as named. 66.

RASP (Fr. *rape*). A stronger and rougher sort of FILE, of different makes and constructions according to the use it is put to by various artificers. Rasps have the teeth formed in quincunx by a sharp triangular-pointed punch, but some of the deepest and coarsest 'cross-cut' files are also known by that name. The term rasp does not appear in MOXON, *Mechanick Exercises* (Smithing), 4to., London, 1677, p. 14.

RASP; see TIRLING PIN and KNOCKER.

RASTRELLI or RASTRELY (CARLO) count, was employed by empress Elizabeth (1741-62) at S. Petersburg, for whom he designed 1744 the palace at Tzarsco-çelo, 1200 ft. frontage; and the first palaces at Strelna and at Peterhof, both near the city; and 1754 the large winter palace, which covers an area of 400,000 ft., the front next the river Neva being 721 ft. long. He was the favourite architect to empress Catherine II (1762-96); was professor in the academy of fine arts; and 1764 court councillor. He also designed 1769 the belfry 290 ft. high, to the church of S. Sergius Radonejski in the great monastery of S. Sergius, at Troitza, near Moscow. He returned to Italy and died 1770. GRANVILLE. *Guide to S. P.*, 8vo., London, 1835, i, 512-9; ii, 478-80; 493; 496. SVININ, *Descr. de S. P.*, 4to., S. P., 1816-28, ii, 139; iii, 61, 85. The palaces Stroganoff, Menzikoff, Schubalof, Woronzof, Anitkof, with others, all at S. Petersburg, are attributed to him. 68.

RAT. Barn floors of wood may be made impervious to rats by digging around the foundations of the building a dry area, 14 ins. wide and 9 ins. deep; the bottom to be paved with brick-flat, the side farthest from the building to have two courses of half bricks, whilst against the building a course of plain tile or slates is to be nailed; and the area filled in with the earth dug out. The doorways may be similarly secured by carrying up a dwarf wall along the opening; J. B. Watson, in BUILDER *Journal*, 1849, vii, 94. If a good projection be given to the footings of at least a foot on each side of the wall, the vermin will never go under; DOWNING, *Country Houses*, 8vo., New York, 1851, p. 197. To prevent vermin getting at poultry, the yard of the latter should be enclosed by a strong close wire fence, the top of which is to be well curled over outwards; as carried out at the Zoological gardens, Regent's Park. Wild peppermint is said to be a reliable exterminator of rats. The accompanying woodcut is the arrangement carried out by J. Bonomi at Roseneath, for preventing rats ascending the main drain of the house. The stone slab effectually prevents their access beyond the shaft, which also serves for inspection. To



exclude rats from a basement; BUILDING NEWS *Journal*, 1874, xxvii, 358, 389; xxviii, 674, 706. Their nuisance and destruction, BUILDER *Journal*, 1867, xxv, 533; 1874, xxxii, 1069.

RATANAPOORA; see AVA.

RATCHELL. A term given to loose stones.

RATCHET BRACE. A tool for drilling a hole in a narrow place where there is not sufficient room to use the common brace. A ratchet wheel is fixed on the drill socket, and turned by a handle with a strong spring attached to force round the socket on the forward motion, and slips over the teeth on the backward motion.

RATE. A term applied in the Metropolitan Building Act, 1774, 14 Geo. III, c. 78, to seven rates or classes of building which were under certain rules and directions as regards their construction. The "first-rate" included public edifices, warehouses, and others, not being a dwelling house. In the Act 7 and 8 Vict., c. 84, 1845, the "First or dwelling house class", comprised four "rates" and an "extra first rate" if above a certain height, or covering more than fourteen squares, or if containing more than seven stories; then, "Second or warehouse class", with four rates; and "Third or public building class". CIVIL ENGINEER, ETC., *Journal*, 1845, viii, 14-5. The term is not now used. BUILDING ACT or LAWS.

RATEABLE VALUE. The value of any land, tenement, hereditament, or property, on account of which any person is liable to any rate or tax, defined by 6 and 7 William IV, 1836-7, cap. 96, sec. 1, as "the rent at which the same might reasonably be expected to let from year to year, free of all the usual tenant's rates and taxes, and deducting the probable average annual cost of repair, insurance, and other expenses necessary to maintain them in a state to command such rent." In the Valuation Act 1879 the definition in clause 108 is much more complete. "The expression *gross value* means the annual rent which a tenant might reasonably be expected, taking one year with another, to pay for an hereditament, if the tenant undertook to pay all usual tenant's rates and taxes, and tithe commutation rentcharge, or any modus or composition real in lieu of tithes (if any), and if the landlord undertook to bear the cost of the repairs and insurance, and the other expenses (if any), necessary to maintain the hereditament in a state to command that rent. The expression *rateable value* means the gross value, after deducting therefrom the probable annual average cost of the repairs, insurance, and other expenses as aforesaid:" and by clause 84, "The percentage or rate of deductions to be made from the gross value, in calculating the rateable value for the purposes of this Act, shall not exceed the amounts named in the fourth schedule to this Act, so far as the same are applicable." This fourth schedule contains the ten classes of hereditaments, and the maximum rate of deductions. The rateable value of each parish in the metropolis in 1872; BUILDING NEWS *Journal*, 1872, xxiii, 260. RYDE, *Parochial Assessments*, INSTITUTE OF SURVEYORS, *Transactions*, ii, 260-69. W. J.

RATH, also called LISS and lios. An earthen enclosure of early date, variously constructed; sometimes of stone and earth. IRISH ARCHITECTURE. WILKINSON, *Geology, etc., of Ireland*, 8vo., London, 1845, p. 55, notices that raths are very frequent throughout most parts, as many as twelve or thirteen being often seen from one point of view. They are generally admitted to have been used for the protection of cattle; they are circular in plan, from 40 ft. to 200 ft. diameter, encompassed by a mound and a ditch. The PENNY CYCLOPÆDIA, v, 383, art. *Brehon laws*, the ancient laws of the Irish, states that the tenements consisted of a homestead with a certain scope of ground annexed; this homestead was denominated a *rath*, which should comprise a dwelling-house, ox-stall, hog-sty, sheep-pen, and calf-house, all which were generally surrounded by a ditch and rampart, and formed, if necessary, a place of defence as well as of residence. There were at least six titles of raths, as described. FERGUSSON, *Rude Stone Monuments*, 8vo., London, 1873, p. 183-94, notices that some raths were residences and burial-places.

In India the square *raths* at Mahavellipore are copies of Buddhist *viharas*, and are the originals from which all the *vimanas* in southern India were copied, and continued to be copied nearly unchanged to a very late period: the Perumal pagoda, at Mádura, erected XVIII cent., is an example (p. 331). At the

Kylas at Ellora *cir.* 800 the outline of the *vimana* is very similar to that of the *raths* above-mentioned, but everything modified to make up a perfect design (p. 338); FERGUSSON, *Indian Architecture*, 8vo., London, 1876.

RATHBONE (AARON), published *The Surveyor, in four books*, imp. 8vo., London, 1616.

RATHHAUS (Fr. *hôtel de ville*); see TOWN HALL.

RATHOE; see RAPHOE, in Donegal.

RATHSTOCK (meister .....), built 1467 the tower of the Nicolai kirche at Spandau. 92.

RATING; see LAND TAX and RATEABLE VALUE. The BUILDING NEWS *Journal*, 1869, xvi, 87, 108, gives titles, dates, and objects of *Rating Acts; idem*, 1878, xxxiv, 28. CASTLE, *Principles of Rating, as applied to the ..... Assessment of Railways, Gasworks, Waterworks, Mines, Cemeteries, etc.*, 8vo., London, 1869, 2nd edit. THE LAND AGENT'S RECORD. RYDE, *Metropolitan Rating*, London, 1881. RYDE, *Parochial Assessments*, in INSTITUTE OF SURVEYORS, *Transactions*, i, 103; ii, 249; and iii, 19; also *The Rating of Country Mansions*, vii, 177-231.

RATIO; see GEOMETRICAL PROPORTION OF RATIO.

RATISBON, and Fr. *Ratisbonne*; see REGENSBURG, in Bavaria.

RATZEBURG or Racesburg (Anc. *Cœnocenum*). The capital of the duchy of Lauenburg, annexed to Prussia since 1865. The bishopric founded 1154 was 1515 annexed to Munster, and 1648 to Mecklenburg. The cathedral (Romanesque) 1154 is of brick and vaulted. QUAST, *Deutsches Bankunst*, 1850, p. 242, considers it an almost exact copy of the *dom* at Brunswick, but having pointed arches, and therefore at the earliest of the commencement of XIII cent. The wood stalls are called XI and XII cents. in GAILHABAUD, *Arch. du Vme. siècle*, 4to., Paris, 1858, iv, pl. 35-6. 14. 28. 50. 92. 96.

RAUDNITZ in Bohemia; see GUILHELMUS.

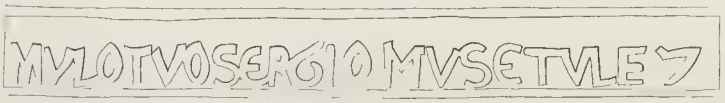
RAUT (JEAN); see RAVY (J.)

RAVACCIONE MARBLE, with Italian-veined white statuary, and dove-coloured, are, mineralogically considered, only slight variations of the same substance. They are all procured from quarries in the immediate neighbourhood of Carrara, in Tuscany. It is also called "Sicilian" and obtained from Ceragiala, Salajo, Costa at Serravezza, etc., at about 3s. 3d. per cubic ft. (1859). The largest blocks are quarried under Monte Sagro. This marble, being of a bluish grey colour, has been used in stables in lieu of white tiles against the wall opposite the heads of the horses. 28.

RAVAGLIO (VIRGILIO), architect of the royal palace at Madrid, designed 1738 for queen Isabella widow of Philip V a pleasure house at Riofrio, near S. Ildefonso; carried out as far as the plinths by C. Fraschina, who was succeeded by P. Sermini, and then by J. Diaz Giamones. 3. 66.

RAVELIN (It. *rivellino*). A work constructed beyond the main ditch of a fortress, and in front of the curtain between two bastions. It was probably first constructed in the place of the more ancient BARBACAN by the Italian engineers. 14.

RAVELLO (anc. Ribelle and Rabello). A town in the province of Principato Citeriore in Southern Italy. It is said to have been founded in IX cent.; and was the see of a bishop from 1086, at which period the cathedral dedicated to the Assumption of the Virgin and S. Pantaleone was founded. The mosaics in the marble pulpit or gospel ambo, 1272 by Nicolas, son of Bartolommeus of Foggia, are given in colours in DALY, *Revue Générale*, 4to., Paris, 1855, xiii, pl. 51-3; and xiv, pl. 43-6. The epistle ambo dates 1130. The bronze doors with their fifty-four compartments of sculptures of sacred subjects, were erected 1179 by Sergio Muscetola and his wife Sigelgaita, and probably executed by Barisanus of Terni, being similar to those in the cathedral of that town, and at Monreale: DOOR (metal); and DOOR, in *Illustrations*, with description. The woodcut gives one line of the inscription. Seven other churches, of which that of S. Giovanni has a good gospel ambo with mosaics of Jonah; the palazzo Rufolo, of great size, with a cloister of two storeys, built *cir.* 1150; and the doorway of the old palazzo degli Afflitti, deserve notice. Details of a *chaire* in S. Pantaleone, in *Le Moyen Age Pitt.*, pl. 71. 28. 50. 96.



RAVENNA. Once a seaport large enough to contain the fleet of Augustus (B.C. 31—A.D. 14), but now five miles from the sea. Etruscan inscriptions have been found on the spot. Tiberius (14-37) built the walls, with the porta Aurea (or by Claudius, 41-54). In 404 Honorius made it the seat of the Western empire; during his reign, and the regency (426-50) of his sister Placidia, it was adorned with many of its noblest edifices. Not long after, it fell into the hands of Odoacer, who was expelled by Theodoric (492-526), under whom it became the capital of the Goths. It was recaptured by Belisarius for emperor Justinian, who 553 appointed Narses exarch of Italy. In 752 or 754 it was made the metropolis of the Longobardic kingdom by Astolphus, king of the Lombards. Pepin in 755 and Charlemagne, having expelled the Lombards, gave the city nominally to the pope. The town of Classis, the port of Ravenna, was destroyed 728 by Luitprand, king of the Longobards. A republic during the middle ages; it was taken by the Venetians in 1440; was French from 1509 to 1512; and in 1530, was given again to the pope. 14. 25. 28. 50. 96.

The fortress, erected by the Venetians 1457, was partly demolished 1735 for materials for the ponte nuovo of five arches over the united streams of the Ronco and the Montone. Porta Adriana, Doric, 1585, on supposed site of porta Aurea; P. Alberoni or Corsini, 1739; P. S. Mamante, and Borghesia, Tuscan, 1612; P. Nuova, or Pamfilia, Corinthian, on site of P. S. Lorenzo, 1653, by G. L. Bernini; P. Sisi, Doric, rebuilt 1568; P. Serrata is now P. Giulia. A grey granite column with a statue of the Virgin dates 1659; two granite columns 1484 by P. Lombardo for the Venetians; a grey granite column 1609 to cardinal Caetani; the torre del pubblico, a large leaning tower; the tomb of Dante, who died at Ravenna 14 Sept. 1321, was erected 1482-3 by P. Lombardo, and rebuilt 1780 in its present form, are the chief memorials.

The churches following are placed as nearly as possible in the order of their erection, and of epochs. The older ones have only nave, ailes, and apse; the transept being no deeper than the aile; CHURCH BUILDER *Journal*, 1879, p. 168.

Duomo or basilica Ursiana, erected *cir.* 380, rebuilt 1734-45, by G. F. Buonamici, who published *Metropolitana di R.*, etc., fol., Bol., 1748. Some alterations 1785-95 by C. Morelli. Part of the old ambo of VI cent., erected by S. Agnellus: and the ivory pastoral chair of S. Maximianus, of VI cent. are noticeable; MURATORI, *Scrip. Rer. Ital.*, ii, p. 213. The circular campanile is ancient (*cir.* VI cent., HUBSCH, pl. 15, fig. 10-2). GRANITE. MONOLITH.

Sto. Spirito; before III cent.; D'AGINCOURT, pl. 73, No. 3.

The baptistery or S. Giovanni in fonte, founded perhaps 380, with the eight figures of prophets in mosaics (425-30 HUBSCH); repaired and other mosaics inserted 430 to 570 by archbishop Neo; they are still untouched and were fully described in TIMES *Newspaper*, 25 Sept. and 30 Dec. 1876; ARCHITECT *Journal*, Jan. 1877; and BUILDING NEWS *Journal*, xxxi, 325. The edifice having sunk 10 ft. into the marshy ground, Sig Lanciani in 1876 arranged to raise it, which has perhaps been carried out. CIAMPINI, *Vetera Monumenta*, fol., Rome, 1757, i, pl. 69; CROWE AND CAVALCASELLE, *North Italy*, i, 10; HUBSCH, pl. 13, 15, 18, 25, and 29.

The Mosaics at Ravenna are also given by CIAMPANI, *Vetera Monumenta*, i, pl. 54-7; D'AGINCOURT (Peinture), pl. 16, Nos. 7-20. PARKER, *Mosaic Pictures in Ravenna*, 8vo., Oxford, 1866.

Ch. of SS. Nazareo e Celso; 440 (420-450 HUBSCH), the mausoleum of the empress Galla Placidia (died 440). In plan, a Latin cross of brick-work, 46 Engl. ft. long by 39 ft. 9 in. wide, vaulted and domed, paved with rich marbles, and the roof covered with mosaics *cir.* 440, having the four evangelists and their symbols; QUAST; G. KNIGHT; HUBSCH, pl. 13, 15, 22, 27. The high altar *cir.* VI cent. in the centre, of Oriental alabaster, was brought from the church of S. Vitale. The lower portion of the walls was panelled about 6 ft. high with the golden-yellow marble of Numidia. A marble sarcophagus contained the body of the empress sitting in a chair of cypress wood clothed in imperial robes; it was accidentally burnt in 1577. Another sarcophagus of her brother Honorius II, died 424, and another of Constantius III her second husband, and of Valentinian III, died 455.

Sta. Agata maggiore; 439 (HUBSCH), completed 417 (BELTRAMI); probably renewed during the middle ages (HUBSCH, pl. 24). A basilica with a narthex at the west end. The tribune destroyed by the earthquake of 1688; a very ancient pulpit is formed out of a section of a huge fluted column of cippolino. A low round tower. CIAMPINI, *Vet. Mon.*, fol., Rome, 1690, i, 184, from FABRI, *Memorie*, 1664, names one Gemellus as having erected the church *cir.* 400.

S. Giovanni Evangelista, and S. G. della Sagra; a basilica founded 414, cons. 425; it has been restored. A cortile or sort of atrium at the west end. Under the choir is the altar, V cent., of the confession, of marble, porphyry and serpentine; HUBSCH, pl. 24, fig. 6. The square campanile *cir.* 425 (or later than 568, HUBSCH, pl. 24), has two bells cast 1208 by Robert of Saxony.

The chapel of the archbishop's palace, consecrated 547, is unaltered; the altar, mosaics, marble slabs to the walls, are as fresh as when first executed.



S. Giovanni Evangelista



S. Giovanni Battista

Sta. Croce, V cent., is in ruins.

S. Francesco from 1251, formerly S. Pietro, 425-30 (HUBSCH, pl. 15 and 16), *cir.* 450, or 492 526. It has been restored. Two fine columns and rich arabesques by P. Lombardo *cir.* 1482. The square campanile 450, or *cir.* 568 (HUBSCH, pl. 15). The monastery, D'AGINCOURT, pl. 17, No. 12.

S. Pietro, 412-25, no longer exists (HUBSCH); see S. Francesco.



S. Apollinare.

Sta. Maria in Cosmedin, the Arian baptistery, with mosaics of VI cent. (HUBSCH, *cir.* XI cent.)

S. Teodoro, between 475 and 526 for the Arians. A small basilica with a portico in front.

S. Apollinare in Città, or Nuovo (493 to 525, HUBSCH), consecrated 558 and dedicated to S. Martino. The mosaics date about 553 or from 570; the marble chair of the Benedictines, supposed X cent. The circular campanile *cir* 450; HUBSCH, pl. 3; 4; 26. G. KNIGHT.

Sta. Maria Rotonda; see Tomb of Theodoric.

S. Michele in Affricisco, *cir.* 545, lately a fish market. QUAST. LANDONI, *Del Musaico*, 8vo., R., 1847.

S. Vitale, 534 (526 HUBSCH), consecrated 547; octagon in imitation of Sta. Sophia at Constantinople. The dome, the first in Italy, is constructed of earthern pots. (POT CONSTRUCTION). The mosaics are of time of Justinian. The ciborium is by M. A. Buonarroti. The entrance was preceded by a portico covered with mosaics, which with the adjoining towers were destroyed by the earthquake of 1688; the foundations discovered 1783. Tomb of the exarch Isaac, died 644. *Illustrations*, plate *Plan*; and *Capital*, pl. 38. G. KNIGHT. HUBSCH, pl. 21; 22; 29; 55. BAROZZI, *Piante della chiesa de S. V.*, plates, 4to., Bol., 1782. GAILHABAUD, *Mons.*, ii.

S. Apollinare in Classe; see later.

S. Nicolò, 768, pointed, is desecrated. Outside is one of the largest sarcophagi in the city.

S. Giovanni Battista, also called S. G. dalle Catine, 425-438, was 1683 almost entirely rebuilt. Some of the columns were found close by on the supposed site of the palace of Galla Placidia; a Greek marble sarcophagus is said to contain her body. The circular campanile 438 is well preserved; six tiers of openings, the terminal cornice, and pyramidal roof are entire

S. Maria in Porto, 1553, with the materials of the basilica of S. Lorenzo in Cesarea, outside the city, built by Honorius; the façade XVIII cent. The cloister dates 1507. An antique red porphyry vase is beautifully worked.

The later churches are: Sta. Maria de' Suffragi; modern: S. Antonio; modern classic: S. Domenico; a restoration of a basilica founded by the exarchs (probably pointed in its shell though now modernised, WEBB); S. Giovanni e Paolo; rebuilt 1758 by Barbiani, has an old tower: Sta. Maria maggiore; Renaissance, the circular campanile dates 541; and S. Romualdo or Classe; (Camaldolese), now the chapel of the college; two fine porphyry columns; its altars are the richest in the city.

S. Chiara is in ruins; and S. Vittore is a humble and rude cross church.

VITRUVIUS, ii, 9, and iii, 3, notices that the whole of the buildings are situated in a marsh, and were founded upon piles of Alnus. Jo. MAGNUS, *Gothorum Sueonumque Historia*, fol., Roma, 1554, p. 338, states that from Rome and Constantinople were taken the marbles to decorate the edifices in Ravenna. To a Buono is attributed many palazzi and churches about 1152; CICOGNARI, *Storia della Scultura*, fol., Venice, 1818, i, 324; and VASARI, *Lives*, edit., 1850, i, 46. One church is by F. Fontana.

Of the palace of Theodoric (484-526), the only portion remaining is a high wall, having in the upper part eight small columns supporting round arches, and a wide recess over the entrance-gate. It was chiefly ruined by Charlemagne (771-814), who carried away *cir.* 801 its ornaments and the equestrian statue of the king which stood near it, chiefly for his church at Aachen. G. KNIGHT; HUBSCH, pl. 38, fig. 15-9; SMIRKE in ARCHÆOLOGIA, 1834, XXV, 579-83; CIAMPINI, ii, 130-1. The pal. maggiore, now Vittoria Emanuele, is supposed to correspond with the forum; pal. comunale or municipio; pal. governativo, XVII cent. with open portico of eight ancient granite columns and marble capitals; archbishop's palace, interesting with its chapel (see above): the collegio in the monastery of S. Romualdo; its *refetterio* a fine hall with good carved wood ceiling and doors; the library founded 1714, has 50,000 vols. and 700 MSS.; the museo by G. F. Buonamici, and published, fol., Bol., 1748; *dogana*, formerly a church; the palazzo Spreti, the largest in the city, is by F. Fontana, *cir.* 1700; and the hospital, formerly convent of S. Giovanni Evangelista, founded by archbishop Codronchi; in the court is a cistern attributed to M. A. Buonarroti.

Outside the Walls. Mausoleum of Theodoric, now Sta. Maria Rotonda, end of VI cent.; of Istrian limestone from Roman Pola; Aloisius of Rome or Padua, is said to have assisted Daniel; circular above a decagonal basement; the roof formed of a single block was cracked it is supposed by lightning; the lower storey cleared 1844 of the water; and the present steps were added 1870. MAUSOLEUM. MONOLITH. JOGGLE JOINT. BUONAMICI, *Rotonda, etc.*, fol., Bolog., 1748-54. G. KNIGHT. D'AGINCOURT, 1847, pl. 18; and 45. ARCHITECT *Journal*, 1870, iii, 104. HUBSCH, pl. 21, 24. FREEMAN, *Hist. Sketches*, 8vo., London, 1876, p. 263. WOODS, 1828, plate. SMIRKE in ARCHÆOLOGIA, 1831, XXIII, 323-6, pl. 29. CADELL, 1820, ii, 37, plate after Clochar. The church of Sta. Maria in porto fuori; end of XI cent. founded by the beato Pietro Onesti, who died 1119; it is covered with frescoes; the square basement of the campanile is supposed to have been part of the ancient pharos. Basilica of S. Apollinare in Classis, a purer specimen of early Christian art than to be found

in Rome; erected 534; consecrated 549 to S. Massimiano; it had a quadriporticus, of which no portion remains, and is erected of thin bricks or tiles. The mosaics of the nave and marbles of the ailes were removed 1450 to the church of S. Francesco at Rimini by sig. Malatesta; those of the tribune, VI cent., are in good order; the modern canopy of the high altar is supported by four columns of the rare marble bianco e nero antico. The brick campanile, 568, is circular, and a fine example; it is 33 ft. diam. and 120 ft. high; HUBSCH, pl. 23; and pl. 21-25.

RUSPONI, *Rav. Libcrata dai Goti.* SPRETUS, *Descr. R.*, 3 vols., 4to., 1732; 1793. ZIRARDINI, *Antichi Edifizi profani di R.*, 8vo., Faenza, 1762. AMADESE, *Chron. Antist. R.* NANNI, *I Forestiere in R.*, 8vo., R., 1821. QUAST, *Die Altchristlichen bauwerke von R.*, fol., Berlin, 1842. FABRI, *Rav., etc.*, 1678. FREEMAN, *Historical Essays*, 1876, p. 263; 3rd ser., 8vo., London, 1879, p. 121. BELTRAMI, *Il forestiero instruito delle cose notabili della città di R.*, 1783. FANTUZZI, *Monumenti*, 4to., Venice, 1801-4. GALLY KNIGHT, *Ecclesiastical Architecture of Italy*, fol., London, 1842-4, i. HUBSCH, *Altchristlichen Baukunst*, fol., Carls., 1858-61. WEBB, *Continental Ecclesiology*, 8vo., London, 1848, describes details of the churches. BERTOLDI, *Memorie del Po di Primaro*, Ferrara, 1785. RUBEIS HIERONYMUS, *Hist. Rav.*, Libri xi, fol., Venice, 1590. ISABELLE, *Les Edifices circulaires*, fol., Paris, 1843. MORONI, *Dizionario Ecclesiastico*, 8vo., Venice, 1852, names the publications relating to each edifice. CADELL, *Journey in Carniola, Italy, and France*, 1817-8, 8vo., Edinb., 1820. WOODS, *Letters*, 4to., London, 1828, ii, 124-33. SEROUX D'AGINCOURT, *Histoire de l'Art*, fol., Paris, 1811-23; and fol., London, 1847, illustrates several of the edifices in pl. 15, 17, 63, and 73, besides those referred to. *Detached Essay*, Campanile.

RAVERTIS (MATTEO DE), 1430, was consulted upon the works at Milan cathedral. 27.

RAVI, or RAVY, and RAUT (JEAN), "masson", according to a formerly existing inscription, worked for twenty-six years at the cathedral of Nôtre Dame at Paris, supposed on the chapels of the north side of the nave, which building it is presumed he completed after J. de Chelles (1257 to *cir.* 1270); the inscription ends with "Jean le Boutelier son neveu les a parfaites l'an 1351". MALINGRE, *Les Annales Générales de la Ville*, fol., Paris, 1640. FÉLIBIEN, *Vie*, 8vo., edit. 1725, v, 247. GILBERT, *Descr. Hist. de la Bas. Métrop. de Paris*, 8vo., Paris, 1821. INKERSLEY, *Inquiry*, 8vo,, London, 1850, p. 108. 3.

RAVIER (JEAN), called de Moret, was masson juré du roi, *cir.* 1403.

RAVILE or REVELL (J.....), was 1562 surveyor of the works to queen Elizabeth, and 1565 was allowed £1200 per annum to be expended in the repairs of the royal houses; he was succeeded by L. Stockett, who was surveyor in 1573. CALENDAR of State Papers, *Domestic Series*, 8vo., London, 1856, p. 201, 262.

RAVY (JEAN); see RAVI (J.)

RAWDON HILL QUARRY, situated at Headingley, near Leeds in Yorkshire, supplied a sandstone of very fine grit, of a warm uniform tint, from about 1856, but closed many years since for trade purposes by its owner the earl of Harewood. It was used at his mansion; the town hall, and bank buildings at Leeds; the London docks; Woolwich arsenal; at Aldershot; the steps and landings in the north-west corner of Tower Street; and 1859 for the dressings and quoins at the Northern Baptist College at Rawden; BUILDER *Journal*, 1859, xvii, 62-3.

RAY; see ANGLE; and PRINCIPAL RAY.

RAYMOND DU TEMPLE, mason, was employed by kings Charles V and VI of France, at the Louvre, where besides various alterations and additions, he made *la grande vis* or the circular staircase, having steps 7 ft. 6 ins. long working round a newel of 2 ft. 6 ins. diam.; CLUTTON, *Domestic Arch. of France*, fol., London, 1853, p. 64 (perhaps quoting SAUVAL), states that "maitre Pierre Raymond" bought twenty tombs from le cimetière des Innocens to complete the work. It was repaired by J. le Mercier. Under 1364, 1370, 1400, and 1370-85 he appears as maçon juré de l'église de N. D. de Paris, and maistre des œuvres du roy; 1370-85 he probably designed the principal building of the collège de Beauvais; 1387 worked at the palais de justice; 1394 on the great chapel of the Célestins for the duke of Orléans; and 1397 was sergeant d'armes et maçon du roy. He was living in Dec. 1403, and left a son CHARLES. SAUVAL, *Histoire*, fol., Paris, 1724, i, 217; ii, 23, 54. QUICHERAT, *Titres concernant R. du Temple;* and other writers noticed in LANCE, *Dict. Biog.*, 1872. CLARAC, *Musée, etc., du Louvre*, 8vo., Paris, 1841, p. 289-92; 638. 3.

RAYMOND or RAIMOND (JEAN ARNOULD, ARNAUD or ARNOULT), born 9 April 1742 at Toulouse, studied at Paris under Blondel and D. Leroy. In 1766 he obtained the *grand prix*, and 1769 visited Rome, Venice, Padua, Treviso, and Vicenza, returning 1775, when for three years he resided at Montpellier. He designed a *lavoir publique* at Nismes (GOURLIER, etc., *Choix*, fol., Paris, 1825-50, ii, pl. 18); and maison Le Brun, rue du Gros Chenêt at Paris; where 1800 he restored the church of S. Laurent. As architect to the Louvre 1798 to 1805, he prepared it from about 1803 for the spoils of Napoleon's victories; he was succeeded by Percier and Fontaine; CLARAC, *Louvre*, 8vo., Paris, 1853, p. 398; LEGRAND ET LANDON, *Paris*, ii, 7; DONALDSON, *A Brief Account, etc.*, in ROY. INST. OF BRIT. ARCHTS., *Sessional Papers*, 1853-4, p. 76-7. In 1805-6 with Chalgrin he made a design for the arc de l'étoile at Paris. They commenced the foundations; then each submitted a design and Raymond's was preferred, but 1808 or 1809 he gave up the appointment and retired (CIVIL ENGINEER, *etc., Journal*, ii, 160); and died 18 or 28 Jan. 1811, at Paris. He was professor of the academy of architecture in 1784; was nominated a member of the institute 1795; and wrote *Mémoire sur la construction du dôme de la Salute à Venise comparée avec celle du dôme des Invalides*, 7 pl. in *Recueils de l'Académie des beaux arts.* The *Projet pour l'arc du triomphe de l'étoile*, fol., Paris, 1812, gives a memoir of him. E. Labarre was one of his best pupils. *Biog. Toulousaine*, ii, 547. LANCE, *Dict. Biog.*, 1872.

RAYMUNDO (EL MAESTRO). A native of Monforte de Lemos, contracted 1129 with the bishop and others to rebuild the cathedral of Sta. Maria at Lugo, in Galicia. He was to have 200 *sueldos* (? dollars) of current money per annum, which might be commuted on terms agreed upon for food, etc. He also bound himself to daily supervise the work in person, and if he died before its completion, it should be finished by his son. It was completed 1177 except the campanile. LUGO. STREET, *Gothic Arch. in Spain*, 8vo., London, 1865, p. 131, 449. He is perhaps the same person as the following. 66.

RAYMUNDUS "*Lambardus*", 1175 covenanted with the bishop of Urgel for seven years, undertaking to employ four other "lambardos", and if then he could not finish the work, he would get as many "cementarii". VILLANUEVA, *Viage Literario*, 8vo., Madrid, 1803-21, ix, 298-300. The whole document is reprinted by STREET, p. 450-1, who considers the "lambardos" to have been members of a guild, and "cementarios" the common masons. 66.

RAYNELM or RAYNALD, bishop (1107-1115) of Hereford, is from an inscription supposed to have completed the church begun by Robert LOZINGA. BRITTON, *Cath. Church*, 4to., London, 1831, p. 8.

RAYONNANT PERIOD (the *ogival secondaire* of DE CAUMONT), of French mediæval architecture, prevailing from the latter end of XIII cent. to nearly the end of XIV cent. It was followed by the FLAMBOYANT period. It embraces the most brilliant period of this style in France, a large number of cathedrals and churches were constructed and finished therein. The Sainte chapelle at Paris is in the early, and the church of S. Ouen at Rouen about the middle of the period. The tracery bears a considerable analogy to the English geometric tracery before the circle had been dismissed as the principal feature. POYNTER, *Contemporary Styles*, in INSTITUTE OF BRITISH ARCHITECTS, *Transactions*, 4to., London, 1842, pt. 2, p. 76. *The Rayonnant period in Belgium;* BUILDER *Journal*, 1860, xviii, 794.

READING-DESK. A framework to support a book. The

white marble reading-desk formerly in the abbey church at Evesham, Worcestershire, is drawn in ARCHÆOLOGIA, 1814, p. 278-9; it was made about 1218 by Thomas de Marleberg, 38th abbot, after his return from Rome. LECTERN. 19.

READING-ROOM. A room attached to a library, sometimes the library itself, wherein persons can consult a book. The advantages of a single room over several are, that it requires only one set of catalogues, attendants, superintendents, receivers of tickets, and books for reference; thus there is greater convenience to the readers, more ready, simple and less laborious service, greater security to the collection, and all at infinitely less cost; *Return*, No. 557, ordered by the House of Commons to be printed 30 June 1852. In the two former rooms at the British Museum, only from 160 to 208 persons could be accommodated, the latter number at great inconvenience. Now, the radiating desks and tables in the one reading-room of 140 ft. diam. accommodate 352 readers, increased 1880 by some 60 additional seats. The lowest series of shelving of about 8 ft. in height allows of about 20,000 volumes being accessible to the readers. The article LIBRARY affords a list of edifices and publications; to which may be added, the Picton reading-room at Liverpool, by C. Sherlock, 100 ft. diam. and 60 ft. high; BUILDER *Journal*, 1875, xxxiii, 1157; 1879, xxxvii, 1139. BUILDING NEWS *Journal*, 1875, xxix, 320, 519.

REAL (MIGUEL); see GUILLEN (P.)

REAR. As, to rear a building; to build or erect. Also to set up on end. 4.

REAR ARCH or VAULT (Fr. *arrière voussure* of de l'Orme), adopted by prof. Willis, as well "scoinson arch", for the internal vault or arch to the opening of a window or doorway. He suggested the adoption of "rear rib", and of "rear shaft". ECCLESIOLOGIST *Journal*, 1846, v (ii, new ser.), 170; SHARPE, *Decorated windows*, 8vo., London, 1849. It was largely used during the Early English and Decorated periods; "Taking all styles together, the rear or rere arch, or in earlier works the wider internal splay, is greatly more frequent, probably because less costly than the other form, the 'through arch'"; SCOTT, *Lectures*, 8vo., London, 1879, i, 280-9. 16. 17.

REASON or RESON PIECE; see RAISING PIECE.

REATE. The ancient name of RIETI, in Central Italy.

REBATE, formerly written, and perhaps correctly RABBET and RABBIT (from Fr. *rabattre*, not *rebattre*). *Rabatyng*, making the groove in the stone work of the window to admit the glass, 1488; SURTEES SOCIETY, *Finchale Priory*, 8vo., Newc., 1837, p. 383, 443. "Rabetts of the wyndowes", 24 Henry VIII; BAYLEY, *Tower of London*, 4to., London, 1824-5. A channel or half-groove cut at the edge of a board, or a door case, for joining on another board, or letting in a door, etc. Rebating to boards does not appear to have been done before XV cent., GWILT, *Encyc.*, 1876, p. 645. GIBLET CHECK. A machine for "dovetailing, grooving, slotting, and rabbitting" was patented about 1856 by John WHINES of London, and by others later. ESPAGNOLETTE. Double rebates or reversible hollow, so that a bead of each stile fits into a hollow on the other. 4

"Rabbet or rabbit head" of a window. A Scotch term for the English "reveal". The Scotch "back filled rabbet" or "rabbet head" is the facing or architrave; *i.e.*, "back filling" is the projection beyond the face of the wall; LOUDON, *Villa Arch.*, 8vo., edit. 1833, fig. 180 and 262.

In exposed situations where walls are built of rubble stone, it is necessary to rebate the back joint of the wrought stone dressings to prevent driving rains penetrating to the interior, as it will frequently do, if the vertical joint be made without a rebate. R. R. R.

REBATE. A hard freestone used for pavements. A piece of wood hafted into the top of a long stick for beating out mortar. An iron tool sharpened like a chisel used in dressing and polishing wood. 2.

REBATED BRICKWORK. Hollow bricks moulded to certain sizes and for dovetailing into each other, and into which concrete was introduced, as explained by HITCH, *Patent Method of Constructing Buildings and Walls*, 8vo., London, 1828. It was much used in the counties of Herts, Essex, Hants, and elsewhere. GODWIN, in CIVIL ENGINEER, *etc., Journal*, 1838, i, 71; and *Hints on Construction*, in LOUDON, *Arch. Mag.*, 8vo., London, 1838, v, 577. HOLLOW WALL.

REBATED MASONRY. A term given to the immense stones with their particularly flat rusticated face, of the time of Herod: as noticed s. v. HEBREW ARCHITECTURE.

REBATE PLANE. (Lat. *runcina*.) A plane used by carpenters and joiners for making a rebate, groove, or channel. 2.

REBOLLI (PONCIUS) canon regular and *operarius*. The cloister of S. Trophime, at Arles, contains his epitaph; he died 7 kalends of January 1183, and to him may be attributed the work of the celebrated portail. DE GUILHERMY, in DALY, *Revue Gén.*, 4to., Paris, 1840, i, 139; LANCE, *Dict. Biog.*, 1872.

REBUS or "name devyse". A graphic pun on the name of a person connected with a building, or a part of it, as a screen, painted glass, etc. It prevailed chiefly XIV and XV cents. It usually occurs in the carved ornamentation. One of the most familiar instances is that of a bird-bolt passing through a tun, used by prior BOLTON. A Roman instance occurs in a frog and a lizard supposed to have been carved to indicate BATRACHOS and Sauros. The rebus was often used in heraldry, in coats of arms. NORRIS DECK, *On Rebuses*, read at meeting of ARCHÆOLOGICAL INSTITUTE at Cambridge, as noticed in LITERARY GAZETTE *Journal*, 1854, p. 660.

RECANATI (Lat. *Recinetum*). A town near Loreto in southern Italy. The cathedral dedicated to S. Flaviano martire, *cir.* 1385, retains a Gothic doorway, a richly carved roof dating early XVII cent., and a tomb to pope Gregory XII (died 1417). In 1711 there were about twenty other churches and oratories, exclusive of the monasteries, of which may be mentioned S. Maria di Castelnuovo 1253, by Nicola of Ancona; S. Domenico 1272, and S. Agostino 1276, having Gothic doorways with round arches; S. Vito of the Jesuits, 1578, by P. P. Jacometti; and S. Maria dell' Assunta by his brother Tarquinio. The palazzo comunale has a large bas relief of the arrival of the santa casa by P. P. Jacometti; and there are several fine palazzi. Near the town is the great aqueduct 1605-21 by Giov. Fontana, as noticed s. v. Loreto. CALCAGNO, *Recanati*, 4to., Messina, 1711. RICCI, *Memorie ... delle arti ... d'Ancona*, 8vo., Mac., 1834. 28. 96.

RECEPTION ROOM. An apartment of a moderate size wherein to receive a number of persons forming a deputation, or for assembling in before a dinner. A *reception suite* of rooms is provided in large houses by the galleries, drawing rooms, libraries, ante rooms, and the staircase.

RECEPTORIUM; see ASPASTICUM, and DIACONICUM.

RECESS. A portion of a wall not built of the full thickness, and thus one may be formed as in a dining room to receive a sideboard; or it may be formed deeper as in a bedroom (ALCOVE) to receive a bed. CAVITY. NICHE. A deep BAY WINDOW is a recess in a gallery or room.

RECESSED ARCHES. The series of arches to an opening, as a doorway, formed within and behind each other, as in the late Norman, and later periods of mediæval architecture. WILLIS calls the whole 'a compound arch'; two divisions is doubly recessed, or it may be trebly or more recessed but not often. In the later styles the divisions are not often so distinct, but appear more like a succession of mouldings arranged on a slanting surface. *Glossary of Terms*, 1840, p. 20.

RECIPIANGLE. An instrument used by French engineers to take angles in fortification, etc. It was a sort of BEVEL, with a protractor. 2.

RECKIN TREE. A horizontal bar of wood or iron placed at a suitable height in the *reck* or smoke of a chimney, and from which vessels are suspended over the fire. "*Rakynt*", in SURTEES SOCIETY, *Finchale Priory*, 8vo., London, 1837, p. 443.

RECLUSORIUM or reclusory; see HERMITAGE. One behind the chapel of S. Peter, in the tower of London, was dedicated 1.

to S. Peter or S. Eustace; *Rot. Claus.*, 37 Henry III, m. 2, 21, as in BAYLEY, *History of the Tower*, i, 129. Many reclusories were established v cent. at Lyon; each was composed of a chapel and an adjoining cell 10 ft. square, with three windows for air, food, and alms. After four years trial, the recluse was accompanied to his cell by the bishop and clergy, the door walled up and sealed by the prelate; DE FAYE, *L'Eglise de Lyon*, 12mo., Lyon, 1859; and BUILDER *Journal*, 1861, xix, 771. In 1403 a girl 18 years of age was immured in a chamber close to the wall of the church of S. Opportune at Paris, having an opening so as to hear the service and receive sustenance; she died aged 80.

RECONSECRATION, reconciliation, etc., of churches. A paper on this subject by E. C. Harington, A.M., is printed in the EXETER DIOCESAN ARCHITECTURAL SOCIETY, *Transactions*, 4to., Exeter, 1849, iii, 224-59. DEDICATION.

RECORD OFFICE. (Lat. ARCHIVIUM, etc.) A building or suite of apartments specially erected for the conservation of the records, charters, and other documents and evidences of a state, house, or community, and where they can be occasionally consulted. The record room at Wimborne minster, Hampshire, is said to remain. Any complete edifice designed for such a purpose should contain, besides the entrance halls, vestibules and corridors; the offices of the superintendent or keeper and his subordinates, with waiting rooms to each; reception, classification and cataloguing rooms, a library and apartments prepared for the use of the transcribers, compilers, or students to be superintended by the officials. The rooms appropriated to the final arrangement and reception of the documents should be well lighted and ventilated, secured from dampness, and not too large to create a difficulty in keeping them at a steady moderate temperature. Every portion of the construction and fittings should be fireproof. CHARTER HOUSE. MUNIMENT ROOM. TREASURY 14

New Record office, Rolls Buildings, Chancery Lane, commenced 1850, shell completed 1853, by J. Pennethorne; CIVIL ENGINEER, *etc., Journal*, 1854, xvii, 281; BUILDING NEWS *Journal*, 1876, xxxi, 229; and BUILDER *Journal*, xxxiv, 888; 1867, xxv, 258. No room within the building is more than 17 ft. by 25 ft. and 15 ft. high; all are distinct from each other, and every part of the edifice is fireproof. Metropolitan Improvement Commissions, *Sixth Report*; BUILDER *Journal*, 1847, v, 513-4; xi-xvi (1854-5) and later *Reports* of Deputy Keeper of *Public Records*. In Dublin, an isolated edifice at the north-west side of the Four courts, a general record depository was erected 1863-65; it is 200 ft. by 100 ft.; cost about £30,000. In Edinburgh, the register house begun 1774 by R. Adam, is 200 ft. square; an additional building was erected *cir.* 1860 by R. Mathieson.

Amongst the buildings of other countries are; palazzo degli archivi or della ragione, at Milan, begun 1228 by podestà Aliprandi, completed 1233 by Ordrado Grosso di Tresseno; façade in HOPE, *Architecture*, 3rd. edition, 1840, pl. 56. Archivo de la corona de Aragon, at the back of the ancient palace of the Gothic kings; and of the casa de Aragon, second only to Simancas; both at Barcelona. The archives and public record buildings at Florence, are in the Uffizie, erected by Vasari for Cosmo I; CIVIL ENGINEER, *etc., Journal*, 1853, xvi, 432. At Naples, the archives are kept in the monastery of SS. Severino e Sosio. At Rome, the *tabularium* or record office of the republic exists on the slope of the Capitoline hill at the end of the forum; a Doric arch was discovered January 1839 by prof. Azzuri. The edifice for the archives of the collège de la guerre at S. Petersburg, in RUSCA, *Recueil*, etc., fol., S. P., 1810, p. 59, pl. 12 H.

RECOUNTERED. A moulding cut out of a block of stone and returned within the line of its own projection. A term used in the south-west of Scotland. W. R. C.

RECOVERY, HOUSE OF. An establishment, at first for the reception of persons suffering from fever, removing them from their families so as to diminish the risk of the disease spreading by contagion. Hence, the Fever hospitals, and those erected under the Metropolitan Asylums Act. The term has of late years been used, with Sanitorium, etc., for homes at the seaside and other places, where the invalid may obtain fresh air and proper care for a time after being discharged from a hospital, or other house of sickness.

RECREATION GROUND. 1857-58, 22 Victoria, c. 27, Act to enable or facilitate grants of land to be made near populous places for public grounds for the use and regulated recreation of adults, and as playgrounds for poor children; and 1860, 23 and 24 Vict., cap. 30. 1877, Metropolitan open spaces act. PARK; PLAY GROUND.

RECTANGLE. A figure whose angles are all right angles. QUADRANGLE. PARALLELOGRAM.

RECTANGULAR SYSTEM of planning; see INTERAXAL SYSTEM, or that of the SQUARE. PROPORTION.

RECTILINEAR. A figure whose boundaries are right lines.

RECTILINEAR (with curvilinear) was many years ago proposed by a writer in the BRITISH CRITIC, 1826, ii, 376, to be substituted for Rickman's (decorated and) perpendicular; about 1460 marking the transition from the *early* to the *late* rectilinear: SHARPE, *Rise and Progress of Decorated Window Tracery*, 8vo., London, 1849, p. 8, who proposes rectilinear for the period 1360-1550 (ENGLISH ARCHITECTURE); and *Seven Periods of Church Architecture*, 8vo., London, 1851. WHEWELL, *German Churches*, 8vo., London, 1842, p. 21, disapproves of the term. BUILDER *Journal*, 1851, ix, 357; and criticism, 387. In Scotland the choir of Dunblane cathedral, and the choir and east windows of Melrose Abbey church are of this period.

RECTORY. The residence of the parson or rector who serves in propriâ personâ the parochial or common church, and who had the right to the great tithes. GIBSON, *Codex Juris Eccles. Angl.*, fol., Oxford, 1761, 2nd edit., 647, 715, 797. The low Lat. term *rectoria* was often applied to any PARSONAGE HOUSE. RIDGE, *on Parsonages*, read at Architectural Association, in BUILDER *Journal*, 1881, xl, 120; 149-52, with remarks by E. Christian. In exposed situations it is useful to connect the rectory house with the church by a continuous roof, so that the rector's study communicates with the church vestry. 14.

A rectory house at Wath, near Ripon, is described as it existed *temp.* Elizabeth, by LUKIS, in ASSOCIATED SOCIETIES, *Reports and Papers*, 1876, 217-8. Parsonage house at Great Snoring, Norfolk, *temp.* Henry VIII, richly decorated; PUGIN, *Examples*, 4to., London, 1830, ii, p. 60. Doddington rectory, Cambridgeshire, "the richest living in England", rebuilt 1873, by W. Smith; BUILDING NEWS *Journal*, 1873, xxiv, 476, cost over £3,500. Merston rectory, Sussex, old half timber, now occupied as cottages; new one in BUILDING NEWS *Journal*, 1876, xxx, 218, *Villa and Cottage Architecture*, etc., 4to. (Blackie), Edinb., 1869. KERR, *Gentleman's House*, 8vo., London, 1865.

RED; see RED COLOUR.

REDAN, or reden. The French term for a projection or break at the angle of a panel; ROUYER ET DARCEL, *L'Art Arch. en France*, 4to., Paris, 1863-66, ii, 20, who also (ii, 25) use the term *quatrelobes à redans* to a panel having a semicircular projection on each face, as in a ceiling, etc. Redan is also used in French for the "step up" of a wall built on sloping ground to make it level at certain distances. 5. 6. 14. 25.

In field fortifications, a redan is a work consisting of two faces forming a salient angle. A double redan is composed of two redans joined together, thus forming a reentering angle for mutual defence

RED BOLE; see REDDLE.

RED BRICK. A brick more or less red in colour, as the earth contains more or less protoxide of iron. At the Nonesuch works, near Ewell, Surrey, a lower stratum, a species of green loam from 18 ins. to 24 ins. deep, without any chalk or carbonate of lime, produces bricks of a rich deep red colour. The GAULT CLAY when it contains iron, burns in the kiln into a

deep red brick and tile of rather inferior quality. In Norfolk is a dark brown clay containing a few small boulders and no organic remains, excepting small fragments of water-worn belemnites; from this clay are made the red bricks in general use in that county; it abounds in the clay districts; its beds are from 12 to 20 ft. in thickness.

Modern red facing bricks are made in places in colours, as, 1. a pretty orange or pale red; 2. a good bright cherry red; and 3. a dark rich red; also Rubber bricks. Red Suffolk facing bricks are from near Sudbury; red pressed bricks from Brentwood and Bishops Waltham; and good ones from Fareham. The best and most durable plain and moulded red bricks and terra cotta being obtained at Costessy near Norwich.

In BUILDER *Journal*, 1855, xiii, 84; 132, it is surmised that the red bricks *temp.* Anne and George I came from Nonesuch, and from Hedgerly near Windsor, at both of which places were made kiln burnt red bricks called Nonesuch and Windsor fire-bircks, easily ground and rubbed. Good "red rubbers" evidently bore exposure to the weather well. In 1767 "'red stocks', and 'finest red bricks or cutting bricks' were made. The latter owed their colour to the nature of the clay and were well wrought; and used for ruled and gauged work, and sometimes for paving; and were set in puttey instead of mortar"; WARE, *Body of Architecture*, fol., London, 1767, p. 60, who abuses red brickwork "as fiery and disagreeable to the eye, troublesome to look upon; and in summer, it has the appearance of heat that is very disagreeable."

Clamp burnt bricks, partially red, are called *samel*, *samile* (salmonly), or *sandel*, bricks; and entirely red, are called *place*; BRICK (p. 138-9). In Dublin 1860-1 red stocks were obtained from Bridgewater and elsewhere; in Sept. 1861, works were set up in Wicklow.

RED BRICKWORK. In 1736, red stock fronts were rubbed and edged only, with common jointed courses; or with tuck and pat courses. The former method was considered stronger and more beautiful than the latter, and was done at Marlborough house, St. James's, under Sir C. Wren; also the orangery, Kensington gardens; and much at Hampton Court. The latter method was said to cost double the former; and in a brick and a half wall, three times; LANGLEY, *Builder's Prices*, 8vo., London, 1750, p. 100, 126, who does not state from whence the red bricks were obtained. Five courses of red stock bricks were then worked to 4 courses of place bricks; and 4 stretchers and 2 headers worked in with 7 place. The mortar in which rubbed and gauged bricks are set is called PUTTY, being fresh lime slaked and sifted through a hair sieve.

RED CHALK. A material used in drawing, being composed of clay, coloured by the oxide of iron. CRAYON. REDDLE.

RED COLOUR. One of the primaries; PRIMARY COLOUR. The ancient red colours were; MINIUM, now known as CINNABAR or vermilion, obtained from Ephesus and Spain; counterfeited with ostrum over sandarac: OSTRUM or carmine; Cerussa usta or red lead; a spurious sort, or sil marmorosum, was made at Rome: Sinopis sigillata, a beautiful colour, of three shades; Lemnian, Cappadocian, Egyptian, or Balearic: Cicerculum or African red: CINNABAR, *i.e.*, Dragon's blood, though Mazois says cochineal, a deep red: Sandaracha, varying between red and yellow; the redder was the most esteemed; with red lead it made Sandyx, of a dull hue, which when mixed with Sinopis was called Syricum; LIBRARY OF ENTERT. KNOWLEDGE, *Pompeii*, 8vo., London, 1832, ii, 53-6.

The modern red colours comprise; Brick red, brownish red, blood red, carmine, cochineal, cherry, chromate, columbine, crimson, dragon's blood, english, flesh, hyacinth, indian, iodine scarlet, lac, lake, light red, madder, orpiment, peach blossom, persian, prussian, red lead, red ochre, rubric or madder lake, rose pink, rose red, scarlet, saturnine, spanish, venetian, and vermilion. BROWN. RED OCHRE. SIENNA. Most of these colours are explained, s. v. FAIRHOLT, *Dict. of Terms* (1870).

RED or YELLOW DEAL; see RED TIMBER.

REDDLE, RUDDLE, or RED BOLE. A soft argillaceous earth, less tenacious when moistened with clay, and impregnated with peroxide of iron, to which it owes the various shades of brownish-red colour in which it is dug out of the earth. By washing, it is rendered fit as a coarse pigment of very extensive use. It is found in large quantities at Micclebring, near Doncaster, in Somersetshire, Gloucestershire, Cumberland, and Devonshire. The best for drawing purposes is obtained from Germany; that from Rotherham, Yorkshire, is the best material known for polishing purposes.

REDE or READE WILLIAM), bishop of Chichester (1369-85) erected 1362 the library (the first one in the city), and the third or small court at Merton college, Oxford; and also 1379-89 his castle at Amberley, Sussex, where the towers at the angles are formed in the base court and so do not project. DALLAWAY, *Western Sussex*, 4to., London, 1815-30, calls Rede "a consummate geometrician". DALLAWAY, *Observations*, 8vo., 1806, p. 26 and 114; *Arts in England*, 8vo., 1800, p. 18; 68-9; *Discourses*, 1833, p. 52; and his edition of WALPOLE, *Anecdotes*, i, 211. ACKERMANN, *Oxford*. INGRAM, *Memorials*, 1837. PARKER, *Illust. Handbook*, 1875.

REDEMPTOR, (Gr. ἐργολάβος), contractor or repairer. MAZOCHIUS, *In mutilum Campani Amphitheatri titulum*, 4to., Naples, 1727, p. 162-3, states "Redemtor, sive qui opus faciendum conduxit, aut qui sarta tecta tuenda suscepit". A tablet is inscribed, Lucceius peculiaris redemptor prosceni ex Biso fecit. TACITUS, i, 27, has Libertus Onomastus, nuntiat expectari eum ab architecto et redemtoribus. CICERO, *Div.*, ii, 21. PLINY, *N. H.*, xxxvi, 55.

RED GRANITE; see GRANITE (p. 73, etc.), and ABERDEEN.

RED GUM TREE; see EUCALYPTUS.

REDHALL QUARRY, near Hailes quarry, Edinburgh, in which city many of its finest streets and squares of the new town have been erected of this stone, which is of a very durable quality and of fine grit, and has a grey tint though some qualities are yellowish. In 1850 the quarry was again brought into working order after a flooding out for twelve years. ARCHITECT *Journal*, 1850, ii, 547. A section of the quarry with the boring machine, etc., in CIVIL ENGINEER, *etc.*, *Journal*, 1851, xiv, 313.

RED HEAT of metals; see HEAT; FUSIBILITY; and PYROMETER.

REDICULUS; TEMPLE TO DIVUS; or the God of Retreat; so called erroneously; and transferred to a small square yellow brick edifice, situated in the valley of the Almone, near the via Appia, and the nymphæum of Egeria, at Rome. BURGESS, *Rome*, 1831, i, 133, attributes it to so late as Septimius Severus (193-211). UGGERI, *Gio. Pittores*, iii; GUATTANI, *Roma descritta*, ii, 44. WOODS, *Letters*, 4to., London, 1828, ii, 46, with a view. BRAUN, *Ruins, etc., of Rome*, 8vo., Bruns., 1854, p. 57. PIRANESI also gives a view of it. 28.

REDJA HAYVET (ABDEL MIKDAM), is mentioned by Medjer-eddeen, a Mahommedan author, as the architect of the mosque of Omar at Jerusalem, built for the caliph Abdel Malik in VII cent. The architect had red hair and a white beard. WIGLEY, *Archæol. Studies*, in ROYAL INST. OF BRIT. ARCHTS., *Sessional Papers*, 1855-6, p. 109.

RED KILN burnt bricks; see RED BRICK.

RED LEAD or minium. A peroxide, or deutoxide, of lead. Lead reduced to litharge, ground to powder, and heated in a furnace until it has attained a fine pale red colour. It bears a good body in oil and is a quick drier (1676). It exists for all practical purposes only in name; an imitation is used by painters. Burgundy red, found in dep. Yonne in France, was put forward as a substitute to prevent oxidation; ARTIZAN *Journal*, 1859, xvii, 46. BUILDER *Journal*, 1859, xvii, 17; xviii, 127, 303; 1879, xxxvii, 160. Used as a paint, its deleterious or corrosive qualities when applied to iron work, were recently (1859) pointed out. J. S. Russell proposed his patented coating of pulverised and subsequently burnished

copper, over a first coating of tar, pitch, or other varnish. Dr. Collyer employs the relative cheaper and (as alleged) equally efficacious metals—zinc, lead, and tin; ARTIZAN *Journal*, 1859, xvii, 156. LITHARGE. MINIUM. OXIDATION.

REDMAN (HENRY), of the Reedman family, co. Hunts., "chief master mason of ye king worke", called 'fremason' in his will, died 10 July 1528. A brass to himself and Joan his wife, in Brentford church, Middlesex, is given in FAULKNER, *Brentford*, 8vo., London, 1845, p. 61, with his will.

RED MARBLE. Rosso antico and others are named s. v. MARBLE. The Phrygian, of two sorts, both of a rosy hue: one with a white shade, the other purple with silver flowers. The red PORPHYRY of Egypt. The quarries from whence the red marble of the Greeks is said to have been obtained, are averred to have been rediscovered on the southern side of the Taygetus, by Siegel, a sculptor at Athens; BUILDER *Journal*, 1854, xii, 24.

Alternate layers of variously coloured stone, the ordinary limestone of the country, a kind of imperfect red marble, known at Jerusalem as the marble of S. Cross, and a bituminous stone found near the Dead Sea, are used at the hospital of S. Helena, XV cent.; WIGLEY, *Arch. Studies*, in ROYAL INST. OF BRIT. ARCHTS., *Sessional Papers*, 1855-56, p. 109. A vein of red marble, found near Jerusalem, supplied A.D. 532 the columns for the church of S. Mary in that city, erected by Theodore for Justinian; two in the portico were esteemed the largest in the world; GIBBON, *Decline*, etc., edit. 1854, iv, 336.

The red marble of Moron used after 1400 in the beautiful and costly front of the *trascoro* in Seville cathedral, a fine example; HURLSTONE, *Arch. of Spain*, in BUILDER *Journal*, 1863, xxi, 347. The floor of the nave of Orvieto cathedral is of the Apennine red marble.

Red Irish marble columns, 33 ft. high, 3 ft. 2 in. diam., from quarries of Sibthorpe and Son, Dublin, are used in the new exchange at Manchester. The red serpentine of Cornwall, the rouge royale of Belgium, and l'ecosse of France, are much used for chimney-pieces and internal decoration.

RED MARL. An argillaceous red portion of the series of rocks between the coal and lias is thus termed in geology. Almost identical marls, similarly associated with red sandstones, lie also in the upper part of the coal, and below the coal and mountain limestone. MARL. 14.

RED MASON, or "hewer of brick"; see MASON.

REDMUND'S PATENT HINGE, for heavy doors and gates; see HINGE.

RED, or BURNT, OCHRE. This pigment comprehends INDIAN RED, LIGHT RED, VENETIAN RED, SCARLET OCHRE, INDIAN OCHRE, redding, REDDLE, bole, etc., also called English vermilion, SPANISH BROWN or Twer, or majolica, all valuable for their permanence in water, oil, crayons, distemper, and fresco. 9.

REDON (PIERRE) with ... Royer, master masons at Bourg en Bresse, constructed 1662 the vaulting of the tower for 3,425 livres, under maitre B. Lacroix; BAUX, *N. D. de Bourg*, 8vo., Bourg, 1849, p. 153.

REDONDO (MANUEL), of Madrid, was employed 1689 upon the tomb of queen Maria Luisa de Borbon, wife of Carlos II. in the church of the Encarnacion, at Madrid. 66.

RED PINE; see RED TIMBER.

RED RUBBER, or red rubber brick. The name given to the best bricks burnt by direct action of flame, that is, in a kiln. It is also called a *cutter*; the others are called *red stocks*. BRICK (p. 140). Red rubbers are often seen carved into ornaments over doorways, windows, arches, etc., and capitals to pilasters.

RED SANDSTONE FORMATION and Devonian series. The old red sandstone formation is the lowest of the secondary strata; it consists of conglomerates and sandstones; coloured marls and concretionary limestones called cornstones; and of tilestones or flagstone beds. Above it is the Carboniferous or mountain limestone formation; and the coal: all three comprising the Carboniferous system; and succeeded by the Magnesian limestone and the *new* red sandstone comprising the Saliferous or new red sandstone system; above which is the Oolitic system. The *new* red sandstone formation consists of coloured marls, gypsum, and rock salt: red and white sandstones and marls; and conglomerate and sandstone. The grains of sand which compose much of the rocks are not red, but white rolled quartz sand, surrounded by red peroxide of iron like a varnish; oxide of iron being one of the most abundant of the substances among volcanic ejections before the deposition of the red sandstones. There is also a layer of red sandstone, having plants of the subjacent coal series occurring in it. The other layers of red sandstone have very few or no organic remains. The formation is largely developed in Ireland, and presents all those parts of the series found in England. It is well represented in Belgium, in beds principally composed of a yellowish sandstone alternating with shale and calcareous beds. In Russia, and in both Americas it is also found. ANSTED, *Elementary Geology*, etc., 2nd edit., 8vo., London, 1856. PAGE, *Advanced Text Book*, 4th edit., 8vo., Edinb., 1857. MILLER, *The Old Red Sandstone*, 2nd edit., 8vo., Edinb., 1842. 14.

As building materials, few of the red sandstones are to be recommended, and even the white layers which accompany them are seldom of much value. The cathedrals of Carlisle and Chester, and the old churches of Coventry, offer a striking warning to the architect; though on the other hand, part of the ancient wall of Penrith castle, still standing and in good preservation, shows that even among these justly suspected strata, some portions, either by their freedom from salt, or some other cause, are to be excepted from censure. The Cheshire red stone was used in the dry arches of the Grosvenor bridge at Chester, 1827-32; in which city, 1853, in the western wing of the exchange, the dressings are of Waverton red sandstone; and it is used 1827-9 at the county lunatic asylum. The effigy, etc., of the altar tomb in S. Catherine chapel, in Carlisle cathedral, to bishop Welton, ob. 1362, is of the red sandstone of the neighbourhood, which was used for the later parts of the cathedral; it was thoroughly restored 1855-6 with redstone from Cove quarries. The only instances near Manchester, of triassic or new red sandstones having been used, are the portico and S. Peter's church, from Oughtrington quarry, near Lymm; and at the beautiful church at Moss-side, which is from Hollington near Ashbourn: BUILDER *Journal*, 1860, xviii, 27. Stone from the Collyhurst quarries has been used in that city. The tower 1428-80 of Bristol cathedral is of Dundry stone. Other stone from Three Elms, near Hereford, is of a yellowish cream colour; Tortworth in Gloucestershire, a grey variety; Bristol from the Avon defile, the ordinary dun red stone, due to the peroxide of iron; and Bishop's Lydiard, near Taunton, of a better quality; these were all exhibited in 1851; BUILDER *Journal*, ix, 605. Little of any exterior old work of the Denbighshire churches remains, as the builders used, as a rule, red sandstone, a bad weather stone, hence the little of XIV century work. At Denbigh castle, however, this stone was used in the interior only, with limestone for the body, and a good freestone for dressings and carving.

The floor of the hall of the Foundling hospital, Dublin, is of an excellent stone, of a reddish tinge, and fine grain, brought from Cumberland.

The red sandstone of Kingoodie was used 1811 in the upper part of the Bell rock lighthouse (DUNDEE STONE).

CALVADOS. COVENTRY. DUNDEE STONE. COVE STONE near Carlisle. EGREMONT STONE. *Supply of water from the New red sandstone*, in CIVIL ENGINEER, ETC., *Journal*, 1848, xi, 188, 381, at Liverpool and Manchester. *Impressions of drops of rain and footsteps of animals on slabs, idem*, 1839, ii, 151. ANSTED, *Water Contents of Chalk*, in INSTITUTION OF CIVIL ENGINEERS, 1850, ix, 374.

REDSEAR. Spanish iron would be as good as Swedish iron, were it not subject to *redsear*, that is, to crack betwixt hot and cold, therefore it must be tended more carefully at the forge. 4.

REDSHORT IRON. A want of tenacity in iron and steel at a red heat, which renders it incapable of being rolled or forged white hot without tearing. Iron which cracks while being worked under the hammer at a welding heat; it is often exhibited by iron which is sufficiently pure to be very tough when cold. The presence of phosphorus (IRON, p. 46), sulphur, and (according to Mushet) calcium, and probably also magnesium, makes iron redshort. (GWILT.)

RED CORSEHILL STONE, from quarries near Annan, Dumfriesshire. A fine grained micaceous sandstone (called freestone in the north) from the lower new red sandstone (Permian) series. It is of a rich red colour (almost blood red), even texture, and great durability—some beds are a bright pink. Its crushing weight is 509 tons; that of Bramley fall 265 tons. It has been used in London from about 1873, as at the Hand in Hand Insurance Association, Queen Victoria Street, Blackfriars: BUILDING NEWS *Journal*, 1875, xxix, 129, which mentions other red Scotch stones. The RED DUMFRIES differs from it.

RED GRIT STONE; RUNCORN QUARRIES, Cheshire. RED MANSFIELD. The blocks vary in beds from 1 to 7 ft. thick, and in landings of very large dimensions. The deep bed, selected quality, is esteemed for durability, fineness of grain, and splendid colour; (MANSFIELD STONE). The RED STAFFORDSHIRE.

Red stone of Tournus, near Lyon, used by sculptors and carvers, takes a good polish. Basle cathedral is erected of a rapidly decomposing red sandstone.

The red sandstone palace at Oodeypore or Udaipur, was erected by emperor Akbar. Red grit stone of the red mountain near the Mokattam hills, near Cairo, which gradually runs into a siliceous rock, was quarried from an early period. 28.

RED STONE QUARRY, south side of the river Dee, at old Chester bridge. The lateral strength of the stone, ARCHITECT *Journal*, 1850, ii, 329.

RED or YELLOW TIMBER, the pinus sylvestris. In commerce called Baltic fir, Riga fir, Memel timber, etc., and red pine of British America and the United States. The pinus resinosa or rubra gives the red pine or deal of the United States; and the pinus rigida or nigra, the pitch pine. It is a very resinous wood. The Memel is the strongest of the red deals, but the Norway spruce or white fir is superior in tensile strength, and the best red American pine is stronger than Baltic red deal. Pitch pine is not so strong in tension as Norway spruce, but in compression it is immensely strong, in a beam raising high the neutral axis; consequently a pitch pine beam is almost as strong as English or Canadian oak, and much stronger than Dantzic or Adriatic oak. Norway spruce is very tough and elastic, and red pine is even much more elastic; BUILDING NEWS *Journal*, xxxvi, 647. The pinus rubra is an American timber, approaching very nearly in quality to Riga timber; it is almost as stiff and is free from knots. It is the produce of Upper Canada and the adjacent portions of the United States, and is shipped from Quebec. It is used for carpenters' and joiners' work generally: being porous, it readily absorbs moisture, therefore when placed in any part of a building where its ventilation is defective, it soon shows indications of dry rot. PINUS. PINE TIMBER. PITCH PINE. CIVIL ENGINEER, *etc.*, *Journal*, 1843, vi, 405. BUILDING NEWS *Journal*, 1874, xxvi, 272: 1878, xxxv, 17.

RED WOOD. The following are among the red woods referred to in this work, for furniture, decoration, etc. CEDAR and CEDRELA ODORATA. CORAL WOOD. EBONY. ERYTHROXYLON. Red Saunders or Ruby wood; see PTEROCARPUS and PTEROMA; Australian red cedar; China red wood of Penang, used only for furniture. Madagascar red wood used for turning and for cabinet work. The red wood of Turkey is Cornus mascula; of the Bahamas, Ceanothus colubrinus; and of Jamaica, Gordonia hæmatoxylon. Large logs of JUNIPER are now imported, the wood being equally suitable for indoor work; SEQUOIA is the most beautiful of the species for joinery or cabinet work. Mahogany (SWIETENIA), and JARRAH are other red woods. The latter is being used (1881) for Hawksley's and Lindsay's patent steps in preference to teak. Cæsalpinia Sapan, Bookum wood, of Travancore; C. Bahamensis, of Jamaica; and C. Braziliensis, Brazil or Pernambuco wood, with many others, are used only in dyeing. Quercus coccifera, Kermes oak, the haunt of the kermes insect, yields the splendid blood red dye used in the old Flemish tapestries, which though 200 years old have not lost brilliancy. 71.

REDUCED BRICKWORK; see BRICKWORK (p. 145).

REDUCED DEALS, or Standard of deals; see HUNDRED. Rules for reducing deals, etc., BUILDER *Journal*, 1874, xxvi, 354. GRANDY, *Timber Importer's, etc., Standard Guide*, 8vo., London, 1865.

REDUCT. An old term in carpentry for "a little place taken out of a larger, for uniformity sake; also for conveniency, as for a cabinet, an alcove, etc." QUIRK. 4.

REED. (Fr. *canne*.) The common name for Phragmites communis, used in some places for thatching. In *cir.* 660 the new church at Lindisfarne was erected of timber and thatched with reeds; DUGDALE, *Monasticon*, fol., London, 1817, i, 219. Many parts of the Fens near Lynn abound with a remarkable species of reeds—they constitute a very durable and neat thatch for houses, and are said to last from 30 to 40 years. Thatching is executed in this county in a style altogether superior to many other places (i, 371). In 1505, "the old roof" of Witton church, Norfolk, "was taken down, the walls helped, a new roof made after the pattern of Little Plumstead—and reeded" (i, 23*). The church of Barton Bendish was at that time covered with reed; NORFOLK TOUR, 8vo., London, 1829, i, 39.

A bundle of reeds prepared for thatching is termed a "bolt". THATCHING. PAPYRUS. ARUNDINARIUS. 1. 25.

VITRUVIUS, vii, 3, notices that timber (stud) partitions when clayed over, swell and shrink and cause cracks; after being covered with the clay, reeds should be placed side by side vertically, and nailed with bossed nails, clay laid over these, and another layer of reeds nailed over the former but horizontally, and finished with stucco; this double row of reeds thus crossed on walls prevented all cracks and fissures.

REEDING. A decoration formed of two or more small convex mouldings called beads parallel with each other, and generally flush with a fillet on each side. BEAD. COCK BEAD. FLUSH BEAD.

RE-ENTERING ANGLE. See INTERIOR ANGLE.

REEPERS. Laths split from the stems of the Palmyra palm, and used in the East for building purposes.

REEVES (CHARLES), born 1815 at Fordingbridge, Hampshire, studied under Thos. Loader of Romsey, and messrs. Suter and Voysey of London. He held the appointments of architect and surveyor to the metropolitan police from 1843, designing and superintending 44 new police stations, and attending also the dangerous structures and common lodging houses; and from 1847 of architect to the county courts in England and Wales, designing and superintending 64 new courts in various parts of the country, as at Bradford, Newcastle, Bolton, Derby, Walsall, Birkenhead, Bristol, Sunderland, Wolverhampton, etc. He also designed, among other edifices, Coalbrookdale church, Staffordshire (ILLUSTRATED LONDON NEWS, 1852, xx, 68); the Shad Thames flour mills; the home for children of missionaries at Highbury; and Pebblecombe house near Betchworth, Surrey. Nearly all his works were in the Italian style. He was awarded a medal for services rendered to the great exhibitions in London of 1851 and 1862. Annesley Voysey was a partner from 1847 till his death in 1852; and Lewis G. Butcher from 1853 until the death of Mr. Reeves, 6th Dec. 1866. C. W. R.

REFECTORY, commonly called frater house and fratery. The dining room of a monastery. There were four sorts; 1 summer; 2 winter, as at Villers, and S. Bertin at S. Omer; 3 of conversation; and 4 misericord, for eating flesh meat (FOSBROOKE, ch. 45; 48; DUCANGE, v, 206). Adjoining it was the *toreyma* or dresser for cups, plates, etc. It was usually oblong in form; in IX cent. it was sometimes apsidal and the

early form of the Eastern refectory, and those at Parenzo, had three apses; at S. John Lateran built for pope Leo III (795-816) it was an imitation of the Roman *triclinium:* at S. Laura monastery on mount Athos it is in the form of a Greek cross.

The refectory was ordinarily placed on the side of, and was parallel with, the cloister, usually the *south* side, to be removed as far as possible from the church, to secure it from noise and smell of dinner. It was connected with the kitchen. At Sherborne, and Blackfriars, Gloucester, it was on the *west* side, an exceptional position. At S. Augustine's at Canterbury, at Durham, and Netley, on *east* side; at Jorevaux (Cistercian), on the *south east* beyond the dormitory. It was at *right angles* (*i.e.*, north and south) to the cloister, at Fountains, (south); Clairvaux, Savigny, Bonport, Tynemouth, Vaux de Sernay, Beaulieu, and Rievaux. It almost invariably fronted the church with the Benedictines, Cistercians, Clugniacs, Augustines, and Præmonstratensians.

It was under the dormitory at Netley; at Furness; at the *marveille* at Mont S. Michel, 112 ft. by 40 ft.; house of the Bernardines at Paris, apparently at La Luzerne, and at Castle Acre Priory. It was *above* a cellarage at Dunfermline *cir.* 1315-60, Battle, Reading, Beauport, Sherborne, Eastby, Leiston, and Kirkstall (Whitaker, *Craven*, 4to., 3rd edit., 1878, p. 84 and plan); and above the kitchen at Winchester.

It had *two aisles* at Fountains, Mont S. Michel, Netley, Eastby, Villers in Belgium, and S. Martin des Champs at Paris (Lenoir, *Atlas des Monts. Franç.*, fol., pl. 32; Daly, *Revue Générale*, 4to., Paris, 1856, xiv, 314, pl. 6, fig. 5; pl. 8, fig. 1 and 2; first half of xiii cent.; Scott, *Lectures*, 8vo., London, 1879, i, 324; it is now the library of the conservatoire des arts et métiers, and was restored by Vaudoyer (Daly, x, 62). Those of S. Mary at York, the Bernardines at Paris, and at Alcobaça had *three aisles.*

Chester, 98 ft. by 34 ft., and Worcester, 120 ft. by 38 ft., are the two most perfect conventual refectories in England.

Battle abbey, 106 ft. by 35 ft.

Priory at Dover, 100 ft. by 27 ft., not divided. Turner and Parker, *Dom. Arch.*, 1851, p. 5.

Combermere abbey, Cheshire, 60 ft. by 28 ft., but shortened. Twyford, v. 2.

Beaulieu abbey, 157 ft. 5½ by 30 ft. 7½. Weale, *Quarterly Papers.*

S. Bartholomew, Smithfield, 120 ft. by 30 ft. by 40 ft. high, with crypt under. Civil Engineer, etc., *Journal*, 1843, vi, 380.

Abbey of S. Denis in France, was a fine one of good construction.

Abbey of S. Wandrille. Langlois, *Histoire*, pl. at p. 10.

Abbey of S. Michael at Antwerp; an interior view in *Acta Sanctorum.*

S. Germain des Prés, S. Nicaise at Reims, S. Ouen at Rouen, S. Austremoine, with others in the *Monasticon Gallicanum.*

Of the more modern monastic establishments, that of the Benedictines of S. Giorgio maggiore at Venice is an esteemed work.

The wall pulpits from which the bible or other religious book was read during meals, and which fronted the guest table, remain at Chester, Eastby, Beaulieu, Shrewsbury, and S. Martin des Champs at Paris. A brass eagle remained until recently in Magdalen college hall. Pulpit. Mural paintings generally decorated the walls; the famous picture by Leonardo da Vinci is in the refectory of Sta. Maria delle Grazie near Milan.

Refectories are also attached to schools; colleges; and the hall took their place in mansions and other large establishments; Turner and Parker, *Dom. Arch.*, 8vo., London, 1859, iii, 49-87, who 69, states that the refectory of one of the larger abbeys would contain much the same furniture as that of a nobleman's, and that one of the smaller religious houses, or of the abbot, the same as that of the smaller gentry; he gives an inventory 1446 of the priory of Durham, with the plate; of the prior's house; 1498 college at Bishop's Auckland; 1412 hall of a vicar; and of a private person. Fosbrooke, *Brit. Monachism*, (1796), 3rd edit., 1843, ch. 35, p. 397. Ducange, *Glossarium*, fol., Paris, 1733-36, v, 650. Lenoir, *Arch. Monastique*, 4to., Paris, 1856, ii, 241, 328, 340, pl. 27. De Caumont, *Abécéd.*, 8vo., Paris, 1851-53; *Arch. religieuse*, 8vo., Caen, 1857, 5th edit., 41, 84. Walcott, *Church, etc., Arrangement*, 8vo., (1861); and in Builder *Journal*, 1860, xviii, 813-4. Fuller, *Church History*, fol., London, 1655, b. vi, p. 285. Milner, *History of Winchester*, 4to., Win., 1839, 3rd edit., ii, 111. 17. 19. 25.

Referee; Reference; see Arbitration; Award; and Contract. The following works supplement the preceding articles. The standard work is Russell, *Treatise on the Power and Duty of an Arbitrator*, 8vo., London, 1877. Archbold, *Law of Arbitration and Award*, 12mo., 1861. Redman, *Concise Treatise on the Law of Arbitrations and Awards*, 8vo., 1872. Fletcher, *Arbitrations, a Text-book for Surveyors*, 12mo, 1875. *Referee in Competitions*, Building News *Journal*, 1870, xix, 141. Architect *Journal*, 1875, xiii, 5-15. Bell, *Treatise on the Law of Arbitration in Scotland*, 8vo., 1877. Jackson, *The Practical Arbitrator*, 8vo., 1879.

Refham (Richerus de), with W. de Leyre and John le Conuers, were surveyors appointed to superintend, 1307-10, certain works about the Little Hall at Westminster palace; Brayley, *Palace*, 8vo., London, 1836, p. 114.

Refinement. Besides the publications cited s. v. Optical correction and refinement, the following are other contributions. Petit, *On Architectural Refinement*, Builder *Journal*, 1859, xvii, 215; 232. The article *Refinement and Building, idem*, 1876, xxxiv, 657. Seddon, *Consistency and Refinement in Architectural Detail, idem*, 1876, xxxiv, 59; 76; and Building News *Journal*, xxx, 32; 55. Penrose, *Optical Refinements in Greek Architecture*, at Royal Inst. of Brit. Archts.; and, B. *J.*, 1877, xxxv, 125; 127; 163; and B. N. *J.*, xxxii, 139. Pennethorne, *The Connexion between Ancient Art and the Ancient Geometry, etc.*, at R. I. B. A., 1879; and in B. *J.*, xxxvii, 174, 208, 224, 290. Le Sueur, *Histoire et Théorie de l'Architecture*, 8vo., Paris, 1879, doubts the theory of optical corrections. Scott, *Lectures*, 8vo., London, 1879, i. 5.

Reflection or Reflexion. The change of direction which is given to a luminous ray of light or heat on meeting a polished surface. The angle of reflection is equal to the angle of incidence; the incident and the reflected ray are both in the same plane perpendicular to the reflecting surface. Bodies with polished surfaces, which show by reflection the objects presented to them, are called *mirrors*, and produce *images*. A *real image* is formed by rays converging after reflection; but a *virtual image* by rays diverging after reflection. The reflection from the surface of a polished body is termed *specular* or *regular* reflection. Light which is reflected regularly gives the image of the luminous source, not of the reflecting surface. Ganot, *Elem. Treatise on Physics*, transl. by Atkinson, 8vo., London, 1863. Brande, *Dict.*, 1875. The curious property possessed by Chinese metal mirrors which are made of a somewhat porous alloy, of reflecting an image, is caused by the image at the back being well hammered; this condenses the metal, and after the face has been well polished the metal in front of the image has its power of reflecting light increased; not that the pattern shines through the metal.

Vitruvius, vii, 3, remarks on a silver mirror made from a thin plate reflecting images confusedly and weakly, whilst from a thick solid plate it takes a high polish and reflects brilliantly and strongly; so plastering, when thin in substance not only cracks but decays; but when well laid on and polished it not only shines but reflects to the spectators the images falling on it.

If thin films of chemically pure copper are seen by reflected light they have the usual copper red colour, if by transmitted light they have a green colour; Tomlinson, *Cyclopædia*, s. v. copper.

As absorption of heat is the point to be avoided in a grate, so reflection is the one to be promoted; polished surfaces absorb little heat, but reflect powerfully; white surfaces reflect better than black, and if rough, less than when smooth. To meet these implied conditions, earthenware, with polished light coloured surfaces, will be the best material to be employed: it will be as perfect a covering as can be obtained, and may be looked upon as the standard of efficiency. Heat, *Detached Essay*, and diagrams. Radiation of heat.

Myers' patent copper 'reflector' stove, used at the London Hospital, was introduced 1876.

HAMERTON, *Lake surfaces; reflections in water*, in ART JOURNAL, No. 51, new ser., 4to., London, 1866, p. 65. Some publications on Perspective and on Drawing describe reflections in water.

REFLECTED LIGHT. The light received on the shadow side of a curved body. "The principal or strongest light on convex bodies will be of greater or lesser extent according to the extent of the convexity, and to the magnitude of the luminary. The light from a torch will be more contracted than that from a window, and the progression of this light on those surfaces is by an insensible gradation from the advanced part where it first catches and shines to the inclining half light, to the half shadow, and to the retired parts or shade, where it is lost. In angular bodies the interruption from the light to the shadow will be sudden and precipitate, as the angles which occasion it. The reflexes, which soften, and sometimes enliven the extremity of the shades, are no part of this direct light, but are either communications from the surrounding air, or from the neighbouring bodies, which are directly illuminated, and they are stronger or weaker according to the proximity of those bodies, and the degree of light they possess"; BARRY, *On Chiaroscuro, Lecture* v. OPIE, *Lecture* iii; and FUSELI, *Lecture* vi; 8vo., London (Bohn), 1848. REYNOLDS, *Discourses*. REFLEX.

In Greek and Roman architecture, the value of reflected light as regards the form of the mouldings, and in the use and position of sculpture, is treated by PAPWORTH, *Essay*, prefixed to CHAMBERS, *Decorative Part*, etc., fol., London, 1826, xxii-v.

REFLECTOR. A means of affording light to a room by the use of a white or reflective surface placed at an angle outside the window or other opening, so that the rays of light are reflected from it to the portions required to be illuminated. Troupeau of Paris introduced (1851 through Chapuis) 'Diurnal reflectors' of copper fluted and silvered and in some cases protected by glass; upon these Chapuis improved by the patents of silvered fluted glass; argento-crystal or broad corrugated crystal; and the luminarium, of moulded crystal with a coating of pure silver on a highly polished surface. HESKETH, *Admission of Daylight into Buildings*, read at INSTITUTE OF BRITISH ARCHITECTS, 17 May 1852, describing reflectors 4 or 5 in. wide on levers and made of glass coated with real silver chemically deposited; and in CIVIL ENGINEER, ETC., *Journal*, xv, 204-5; 267-70. Silvered porcelain reflectors; *idem Journal*, xviii, 431; and by Fitzmaurice in INST. OF CIVIL ENGINEERS, *Proceedings*, xv, 24.

White paint, limewhited or painted walls, white glazed bricks, and tiles, are other means of obtaining reflected light or the effect of it in some degree.

REFLEX. The body or a part of it in a picture illuminated by light reflected from some other body in the same picture. REFLECTED LIGHT. 4. 6

REFORMATORY or farm industrial school. An institution for the education and training of pauper and criminal children. The first step out of the system of pauper slavery is due to Pestalozzi of Zurich; it was recommenced 1799 by de Fellenberg at Hofwyl, and his disciple Verhli at Kreutlingen; LITERARY GAZETTE, No. 1835, after 1848. The statute 17 and 18 Victoria (c. 74), c. 86, first authorised the sending of children under sentence to these private foundations. 20 and 21 Vict. c. 55; and 24 and 25 Vict. c. 113 are among later acts. It should not seem to be a place of punishment, but of refuge and kindness. Convenience of internal arrangement is the chief requisite. A committee room, dining hall and school room, bath, lavatory, laundry, store room, kitchen, workshop, foul washhouse, master's residence, dormitories, probationary and refractory wards, are the principal accommodation required. Examples at Manchester and Salford, 1857, BUILDER *Journal*, xv, 463; and S. Vincent de Paul, Dublin, 1858; *Idem*, xvi, 617. *Idem*, xvii, 337-8. Agricultural College at Mettray, near Tours; ALLGEMEINE BAUZEITUNG, 1847, pl. 124. The Philanthropic Society's Farm School, at Redhill, near Reigate, Surrey; in THE SUNDAY MAGAZINE, *A Prison without Walls*, 1875, p. 115-20. INDUSTRIAL SCHOOL. REFUGE. Conference at Bristol, May 1881.

REFRACTORY CLAY. A clay so called from its standing exposure to great heat without change or injury, such as FIRE CLAY. It is a quartzose conglomerate with a siliceous cement, in beds, especially black band, forming the base of the coal measures. The Stourbridge clay is one of the most refractory clays known, and has long been employed almost alone in the manufacture of bricks for lining the different parts of a blast furnace; also for burning coke fuel: and for crucibles. Besides the analysis of Stourbridge clay given s. v. Fire clay, another is, Silica 51·80, alumina 30·40, protoxide of iron 4·14, magnesia 0·50, water and organic matter 13·11, making 99·95. Tame valley fire clay is, Silica 62·380, silica uncombined 1·910, alumina 25·932, magnesia 0·280, soda 1·840, and water and organic matter 7·138, making 99·480; BUILDER *Journal*, ads. January 4, 1862. A fire clay of remarkable purity at the Grangemouth coal company, consisted of about 64 per cent. of silica, 34½ alumina, with less than 1½ of iron, lime and phosphates. Mica, graphite or plumbago, steatite or soapstone, potstone, pyrallolite, some kinds of sandstone, are among the refractory minerals. GANISTER. ASBESTOS. PUMICE. 71.

REFRIGERATOR. A term sometimes applied to a system of pipes contained in tanks called 'coolers' of cold water and used for the cooling of large quantities of hot liquids which are made to circulate through the pipes; or cold water passes through the pipes. By means of this apparatus, beer before it gets to the outlet of the tank becomes cold, causing a great saving of time, and the beer is consequently brewed in much better condition than if left to cool merely by the action of air passing over it. The 'cooler' at messrs. Goding's brewery (1855) was 19 ft. long, 7 ft. 6 in. wide and 6 in. deep. Davison's refrigerator at messrs. Truman's brewery, is explained in CIVIL ENGINEER, *etc., Journal*, 1840, vii, 211. BREWHOUSE.

Refrigerators as used in breweries are required to cool the wort down to about 56° before fermentation commences. They may now be divided into two classes, the one working vertically, the other horizontally. Of the vertical kind the two most in use are those known as Baudelot's and Lawrence's; the former being constructed of a number of copper tubes fixed horizontally, the number being according to the size of the machine, and connected at the ends by bends; the water used for cooling is admitted at the end of the bottom tube, and after flowing through the tubes escapes from the top, the wort flowing over the outside of the tubes in a thin film. Lawrence's is the same in principle, the difference in the construction being that corrugated sheets of copper are used in place of tubes. The height required for this class of machine varies from 4 ft. 6 in. to 6 ft. Of the horizontal class that by Morton consists of a shallow wooden vessel lined with copper, in which are fixed, transversely, a number of flat tubes connected at the ends, through which the water flows, the wort to be cooled passing from end to end of the machine, flowing alternately over and under the water tubes. Bennett's and Bridle's refrigerators work on the same principle, only instead of the tubes being fixed and flat, the water tubes are round and of small diameter, and are mounted in a frame to allow of lifting for cleaning. Pontifex's is made upon the same principle, but the tubes have a slight oscillating movement communicated to them by means of an eccentric driven by machinery. The height required for this class of machines would be about 2 ft.

In addition to the refrigerators, many of the large brewers are using ice-making machines, in order to cool the water to be afterwards used in the refrigerators, down to about 40°. The cooling as effected by one system is the evaporation of a volatile liquid *in vacuo*, generally ether or ammonia. If ether be used, it is placed in a perfectly air-tight strong vessel, in which a number of small pipes are fixed, and is evaporated by means of a vacuum pump, the heat from the water flowing

through the small tubes being abstracted by the evaporation; the ether being condensed is worked over again. If ammonia be used, it is condensed by being submitted to great pressure and afterwards allowed to resume its aërified condition in a suitable vessel; this abstracts the heat from the water flowing through a number of tubes fixed in that vessel; the ammonia being recondensed is worked over again.

Another class of machines for producing cold air for cooling rooms are those in which air is compressed by means of a suitable pump, and is cooled in its compressed state by means of jets of water; the cooled and compressed air on its escape from the machine expanding rapidly produces a certain amount of cold, the intensity depending upon the amount of pressure employed. G. S.

Method of Cooling the Atmosphere of Rooms in a Tropical Climate, by C. PIAZZI SMYTH, read at BRITISH ASSOCIATION, Edinburgh 1850; ARCHITECT, *etc., Journal*, ii, 412-4; 434; 532; 556; and PRACTICAL MECHANIC *Journal* (Johnson), iii, 155; 194; 1852-53, v, 188.

The metal refrigerator or ice safe, for preserving food in hot weather, patented 1866 by Falck.

REFUGE. Amongst the varieties of the ancient hospitium or hospitale, occur the establishments which received poor people who only obtained lodgings. Such certainly was Elsing's spital in London, which provided a hundred beds for blind and palsied persons who begged their daily food: and such apparently was Hyldebrond's or Hilburn, or S. Edward's spital at Norwich. In some cases food also was given, as in the hospital of S. Mary Magdalen at Ripon, which supplied food and a bed for one night to pilgrims, mendicant classes, and other needy persons: and this establishment is mentioned as a *refuge* rather than as a *rest*, on account of the restriction of its benefits to one night; this might be aimed to prevent the stay of minstrels, etc. ALMSHOUSE. HOSPICE. HOSPITAL. REFORMATORY. REST.

The Society for homeless and destitute children has built a "refuge, farm, and country-house" at Bisley, near Woking, Surrey, for 150 boys; BUILDER *Journal*, 1869, xxvii, 21-2.

REGALS; a pair of. A small portable finger ORGAN, used during XVI and XVII cents. ARCHÆOLOGIA, iii, 32. FAIRHOLT, *Dict. of Terms*, gives a woodcut from a painting by Memling, on the chasse of S. Ursula at Bruges. 14. 17.

REGEASSE STONE. A sort of stone as fine and nearly as hard as alabaster, but much whiter, obtained at Bodin, near Angers. The large château du Verger, begun 1499 and nearly demolished 1780, was built of it. RICH, *Hist. sur l'Anjou*, 1824.

RÉGEMORTES (... DE), le jeune, engineer, was elected 1765 member of the academy of architecture at Paris, and died 1774. With de Wailly he was master of B. Poyet. He published *Description du nouveau pont de pierre construit sur la rivière d'Allier à Moulins*, fol., Paris, 1771. 68.

REGENSBURG (Anc. Castra regia or regina; Augusta Tiberii; Artobriga; Lat. Ratispona; Eng. RATISBON; Fr. Ratisbonne; Ital. Ratisbona.) A city of Bavaria, situated at the confluence of the rivers Danube and Regen; over the former is a stone bridge 1135-46 of fifteen arches, 1092 ft. long and 25 ft. wide, leading to the suburb Stadt am hof, which suffered severely in 1810. The bridge at Jacob's-thor was built 1423 by W. Hohenberger; the gate-house (about to be destroyed) is given in BUILDER *Journal*, 1877, XXXV, 859. The city ranks in early German mediæval art as Nuremberg does in a later period. Numerous mediæval houses retain the armorial bearings of their ancient owners, as in the Scherer strasse; their towers of defence, as the *goldene thurm* in the Waller strasse, the *hochapfelthurm* in the wadmarkt, the *Goliath haus* of the Tundorffer family, XIII cent., near the bridge, the *römer-thurm* in the kornmarkt, and that by the golden cross hotel. The Gothic column or cross near the Jacobsthor 1459 was restored 1846 or 1855. The *predigersäule* near the Petersthor, XIII or XIV cent., was restored 1858. A small circular temple was erected 1808 or 1817 to Kepler who died 1630. The city is the see of a bishop, founded VIII cent.

The *dom* (one of the finest Germanic pointed churches in Europe), dedicated to SS. Peter and Paul, having been burnt 1273, the first stone of a new one was laid 1275; the choir completed 1280; nave 1381-1436; north tower 1410; 1482-96; south tower 1325 or 1404. The edifice was carried out under the *werk meisters* Ludwig magister operis 1306, Albrecht about 1318, Heinrich der Zehntner 1380, Liebhart Mynnaer 1395, H. Duernstetter Wenszla 1399, Andreas Egl 1436, F. Sphys (or Speiset) 1451, Konrad Roriczer 1465, Thomas Roriczer 1482. West façade with its richly sculptured angular portal (decorated style), BUILDER *Journal*, 1867, XXV, 611; LE MOYEN AGE MONT., pl. 64, completed 1482-6 by Mat. Roriczer, *thurm-meister*; and the works carried on under W. Roriczer, who died 1514; and E. Heydenreich, died 1524; and until 1634 when the vaulting was completed (an engraving s. v. Drawing, p. 66, is dated 1655). The edifice was restored 1613-49; the cupola added end of XVII cent. by Anton Riva of Landshut is now removed; the interior was repaired 1833-38 by inspector Nadler of Ratisbon under F. von Gaertner; BUILDER *Journal*, 1867, XXV, 590; the west towers completed 1859-70 or 75 under—Denzinger. The altar dates 1785; and the octagonal pulpit 1482. The Gothic draw-well, upwards of 60 ft. deep, is given in KING; GAILHABAUD, *L'Arch. du Vme.*, iv; PROUT, *Sketches*, 1841. Still adjoining the north transept is the temporary *eselsthurm* or ass's tower for the conveyance of building materials up a winding inclined plane. In the cloisters the tracery resembles the plateresque. Baldachinos of XIV cent., in B. *J.*, 1874, xxxii, 11. The dimensions of the edifice are given as 384 ft. by 128 ft.; nave 40 ft. by 120 ft. high; ailes 30 ft. by 65 ft.; bays 30 ft. wide from centre to centre; the towers 42 ft. square; (interior 306 ft. by 125 ft. by 132 ft. nave, BAEDEKER); (and 486 ft. by 349 ft., OTTIE, p. 25). QUAGLIO, *Mont. remarquables*, fol.; King, ii, pl. 1-13; SHAW, *Arch. Sketches*, 1858, pl. 92-3-4; WIEBEKING, *Descr. complète de l'église cath.*; POPP ET BULEAU. Its geometric proportions, in ALLGEMEINE BAUZEITUNG, 1845, pl. 650. The sketches (*risse*) of the *dom* are to be seen (OTTE p. 9). SCHMIDT, *Facsimile einer original Zeichnung zum dom*. Adjoining the cloisters are the *allerheiligen kapelle*, from X or XI cent., or 1162; (XII cent., KALLENBACH), a Greek cross, stone-vaulted and domed (WEBB); and the *alte dom* or Stephanskapelle, VIII cent. KALLENBACH, (XI, QUAST.); or *cir.* 1200 or earlier (WEBB); a basilica vaulted, with eleven semi-circular niches in the walls, an old altar and a low gallery at either end; WEBB. OTTE. KING, ii, pl. 17, gives church and cloister.

S. Emmeram kirche, founded 652, restored *cir.* 800 by Charlemagne, is chiefly XI and XII cent.; it was modernised *cir.* 1720, and is now half in ruins; a fine western crypt; transept and parts, transition to Gothic. A stone gallery on the four sides; a narthex with round arches, restored 1163-89 after a fire (WEBB); a detached campanile. The vast monastery dating from the foundation, was 1809 converted into the palace of prince Thurn and Taxis; the stabling is extensive; the riding school 1830 has bas-reliefs by Schwanthaler. The cloisters are fine XIV cent. work restored; the mortuary chapel in the area of two stories by Klein, contains the statue of Christ by Dannecker; POPP; KING, ii, gives three tombs, pl. 14-15. The *Schottenkirche* or Benedictine church of S. James (Jacob), founded 1120 or 1130 by the Scoti or Irish missionaries; a basilican plan with a flat ceiling to the nave, and ailes vaulted; the dates, end of XII cent. or early XIII cent., and 1175-1200 (KALLENBACH), are given to it. The curiously sculptured early Romanesque north porch, in POPP; GAILHABAUD, *Monumens*, ii; KING, ii, pl. 16; LANGE, *Vues originales des villes de l'Allemagne*, 4to., Darms., 1832, i; ALLGEMEINE BAUZEITUNG, 1849, pl. 224-7; GRILLE DE BEUZELIN, *Chapelle Mon.*, Paris, 1835; WEBB; L'UNIVERS PITT., ii, pl. 136. The monastery was broken up 1860, but considerably enlarged 1862 as a seminary for priests. Masons' marks are given in QUAST, and in OTTE, p. 169. The *obermünster*, modernised Romanesque, long since dissolved, had a princess abbess; over the stalls are glazed projecting galleries for the

nuns (Webb); a detached campanile. The *niedermünster*, modernised Romanesque, dating xii cent., is also dissolved. The *altepfarrekirche* of S. Ulrich, fine early German with Romanesque details, after 1250-63 (Quast); or 1290-1300 (Mertens), is now a museum; B. *J.*, 1865, xxiii, 587, 590; Webb; King, pl. 18; Popp et Buleau. *S. John* church dates 1128. Dominican church of S. Blaise, 1274-77, early German (Quast); 1230-40 (Kallenbach); or commenced 1278; the chapter-house and cloisters are interesting; King, pl. 20; Grueber, *Christl. Mittelalter. Bauk.* Holy Trinity or Lutheran church has a lofty arched roof without a pillar. The fine Friars minorite church, early xiv cent., now a barrack store; Webb; King, pl. 19. Other churches have been much modernised and altered.

The *rathhaus*, 1318; 1350 Kallenbach; or completed 1400; the north side after 1660 and completed 1723; it has nineteen or twenty dungeons, with three or four well-dungeons; and a torture chamber, the still carefully-preserved implements in which are explained in *Institutio Criminalis Theresiana*, 1769: Geyer, *Hôtel de Ville*, fol., 1786; a window in Quaglio, *Vues originales*, fol.; L'Univers Pittoresque, pl. 135. Bishop's palace now a brewery. Theatre rebuilt after a fire in 1849. The *unterhaltungshaus*, comprising an assembly room, theatre, club, and restaurant, 1853. A Gothic villa building 1856 by prof. Foltz for king Max. Joseph. Dotzinger.

Popp et Buleau, *Les Trois Ages de l'Arch. Goth. en Allemagne*, fol., Paris, 1834-41; or *L'Arch. du Moyen Age à Rat.*, fol., 1834-9; Kallenbach, *Atlas zur Geschichte der Deutsch. mittel. Baukunst*, fol., 1847; Webb, *Continental Ecclesiology*, 8vo., London, 1848; Beattie, *Danube, etc.*, 4to., London, 1844; Quaglio, *Merkwürdige Gebaude*, fol., Carls., 1818; Whewell, *Arch. Notes on German Churches*, 3rd edit., 8vo., 1842; Eggers, in *Deutsches Kunstblatt*, 1852, iii, 164; King and Hill, *Mediæval Architecture and Art*, 4to., London, 1858-68; Brewer, in Royal Inst. of Brit. Archts., *Sessional Papers*, 1867-68, p. 150-3; Gumpelzhaimer, *Regensburg's Geschichte*. Sighart, *die Mittel. Kunst in der Erdiöcese Munchen Freising. Illustrations*, Capital, two plates. Chamfer stop. Groined roof. 1. 14. 28. 50. 92. 96.

The *Walhalla* at Donaustauf, six miles below, commenced 1830, and inaugurated 19 October 1842, is by L. von Klenze, *Walhalla, in Art. und tech. beziehung*, fol., Munich, 1842; Illustrated London News, 1842, i, 428; Raczinsky, *L'Art moderne en Allemagne*, 4to., Paris, 1839, ii; Baedeker, *Southern Germany*, 12mo., Leipsic, 1880, p. 92; Civil Engineer, etc., *Journal*, iv, 109, with views, 449; Builder *Journal*, x, 386. The *Befreiungshalle* at Kehlheim, begun 1842 by F. von Gaertner, was completed 1847-63 by L. von Klenze. The designs by the two architects are given in Allgemeine Bauzeitung, 1863, pl. 607-12.

REGGIATO; see Giallo antico. Reggio marble.

REGGIO. (Anc. *Rhegium Lepidi.*) A town in the late duchy of Modena, in northern Italy, near the river Crostolo. It is the see of a bishop. The Gothic cathedral dedicated to the assumption of the Virgin, and to S. Apollinare, is of xv cent., but modernised. The church of Madonna della Chiara (or della Consolazione), a Greek cross, was begun 1597 by — Balbi, and completed by Pacchione (pupil of the sculptor Clementi), who added the vaulting of the cupola; many series of frescoes; the organ case *cir.* 1740 by A. Cugini. The basilica of S. Prospero, was rebuilt xvi cent.; the façade with the six colossal marble lions (said to have supported the portals of the Lombard edifice) date 1504 by Gaspard Biso, according to an inscription given by de Caumont, in *Bulletins Monumentales*, Excursion Archéologique; and in Comité Historique des Arts, etc., 8vo., Paris, 1842-3, ii, 57. The church of the new fraternity of Sta. Maria del Gonfalone, 1640, by A. Affarosi, is now suppressed. Church of S. Filippo 1672 by G. Baltrami. The church and monastery of S. Marco, *cir.* 1460 probably by A. Casotti, who also designed Sta. Maria delle Grazie, now destroyed. S. Domenico, and the church of the padri Conventuali, are *cir.* 1725 by G. Ferraroni; that of S. Bartolommeo, *cir.* 1730 by M. Montanari.

A handsome town hall; a good museum and public library; a fine *teatro del pubblico* designed after the fire of 7 March 1740 by A. Cugini, with an assembly room, forty-eight other rooms, and a portico 230 ft. long; it was engraved by C. Manfredi, 4to., Rome, 1742. The baths *cir.* 1730 are by M. Montanari. The palazzi Masdoni (afterwards Toschi), and Guicciardi; the *loggie* of the seminario; and the ducal palazzo di Rivalta commenced for Francesco III while prince, were designed *cir.* 1725 by G. Ferraroni.

Canossa is twelve miles distant. 14. 28. 50. 96.

REGGIO (Anc. Phœbia, B.C. 700; named by Julius Cæsar *Rhegium Julii*). A seaport in and capital of Calabria Ulteriore I, in southern Italy; and one of its oldest Greek towns; in the time of Strabo (55-24 B.C.) it retained the Greek manners, customs, and language. The town was completely ruined by the great earthquake of 1783, but has been rebuilt on a regular plan. It is the see of an archbishop. The cathedral, dedicated to the assumption of the Virgin, dates from 1783, and is said to be an altered reduction of S. Peter's at Rome. A collegiate and seven parochial churches; a good fountain on the marina; and a theatre 1818, appear the chief works. Swinburne, *Travels in the two Sicilies, etc.*, 8vo., London, 1783-5; Valery, *Voyages en Italie*, ii, p. 192; Lalande, *Voyages*, iv; du Fresnoy, *Méthode, etc.*, iii, 359; Willemin, ii, p. 34. 14. 23. 28. 50. 96.

REGGIO MARBLE; *reggiato*; see Giallo antico. Two columns of it are in the gallery at Woburn abbey, the seat of the duke of Bedford.

REGISTER. The flap at the top of a fire grate for the purpose of shutting off the down draught when the fire is not alight; it also contracts the flue and so far regulates the updraught, economises fuel, and may prevent a smoky chimney. The first idea of a register was a damper used in the flue, and still used to coppers and furnaces; Franklin, *Smoky Chimneys*, 8vo., Phil., 1787, p. 44-5.

A register stove is mentioned in 1821. Edwards' patent chimney bar (Builder *Journal*, 1860, xviii, 535); Gibbs' (Liverpool) registered chimney lintel (B. *J.*, 1867, xxv, 282); and Mills' improved register door, are all adapted for the same purpose. A hopper can be used for a similar effect. The "register sham front with register door and frame" is a late (1880) invention.

REGISTER OFFICE; see Record room.

REGLET. (Lat. *regula*; Fr. *réglet*); or bandelet. A flat, narrow, and square moulding with which panels are separated; also by which guilloche and interlacings are formed. It differs from the fillet or listel in that it does not vary in form. The Lat. *Regula* is the small fillet or rectangular block above the guttæ, and below the *tænia* or band or fillet in the Doric architrave. 1. 2. 19. 25.

REGNARD (.....), architect du roi, was one of the masters of A. M. Peyre. A porte cochère in rue d'Anjou S. Honoré, is given in Krafft, *Portes, etc.*, fol., Paris, 1838, pl. 31.

REGNAULT, or Renault de Cormont. See Amiens; Cormont (J. de), and Lusarches (R. de).

REGNAULT (Mathieu), completed 1440 the pont sire Jean du Cange, at Amiens, still existing, and its towers which were destroyed a few years before 1872; Lance, *Dict. Biog.*

Régnier (Louis de), marquis de Guerchy; and M. de Guerchy (Gabet), born about 1780 (Nagler); built the théâtre du Gymnase; later restored the salle du Vaudeville, rue de Chartres, burnt 1838; and with Huvé directed the construction of the salle (Opera comique), rue Ventadour. He was in 1830 architecte du ministère de la marine. He died of cholera 7 May 1832, aged 50 (not therefore in 1852 as stated), at the hôtel des Invalides. 68. 110. 112.

REGNUM. The Lat. name of Chichester.

REGOLD BOARD; see Ragold, Rigold, and Mould (p. 135).

REGRATING. (Fr. *regrattage; ravaler*). The process of removing the outer surface of an old hewn stone, so as to give it a fresh appearance. Cleaning down, restoring, skinning,

dragging, reworking, and tooling away, are terms for processes more or less producing a similar effect. 1. 2. 17. 25.

REGUERA GONZALES (MANUELE), born 26 June 1731, was a pupil of P. Menendez. He designed 1731-80 the warm baths near Oviedo, in which city he designed 1764 the nave of the parish church of S. Isodoro; finished 1768 the church and cupola of the magnificent *hospicio provincial* begun by V. Rodriguez; *cir.* 1780 added a tower and portico to the large Dominican church erected 1553 by J. de Cerecedo; with other works there deserving notice; designed 1780 the stone bridge at Grado in Asturias; directed the works of the dam of Gijon after the death of his master; designed the casas consistoriales at Pravia; the sanctuary at Cobadonga; the parish church at Lastres; and the gallery for the library of the Benedictines at Oviedo; with other works. He died 13 June 1798, and was buried in the church of Sta. Maria la real, called la Corte. 66.

REGULA. The Latin term for the plinth under the base of a column, or of its pedestal. ORLE. The band below the tænia in the Doric architrave. Also a workman's measuring rod or RULE. 1. 4.

REGULAR CANONS. Characteristics of their monasteries; by WALCOTT, in BUILDING NEWS *Journal*, 1876, xxx, 217.

REGULÆ or straight bars; see ARCUS FERREUS.

REGULARITY. A resemblance or similarity of all the parts of a design.

Irregularity / Regularity) similarity of parts { considered separately. / as constituting a whole.

An effect of order; it is most important in a monument of art; BLOUET, in DALY, *Revue Générale*, 4to., Paris, 1845, vi, 521. ALISON, *Essays on Taste*, 1790; 5th edit., 1817. 25.

REGULATION; see RULE.

REGULATOR. An invention about 1872 for doing away with the usual "service-box" to the cistern of a water-closet, and substituting an apparatus near the pan. "Underhay's new patent brass air-regulator" is a cylinder, the sucker in which when raised by the handle causes a vacuum, and air passing through a regulating screw at the top regulates the descent. Hayward, Tyler, and Co.'s "improved stool-valve" is a cheaper kind. "Stone's patent universal brass regulator" has two cylinders; the handle raises the piston in the larger one, the descent being checked by the piston having to force the air-valve at the top of the smaller cylinder. "Howard's patent regulating valve", is another system.

REID (ROBERT) of Lowood, was born 1776. He designed at Edinburgh, 1806 the bank of Scotland, greatly extended about 1860 by D. Bryce, and completed by the erection of the terrace wall by messrs. Peddie and Kinnear; 1808-40 the new courts of law, the elevation embracing three sides of the Parliament square, extending over the ancient front of the Parliament house; the upper library of the society of writers to the signet, (the dome painted by Stothard); competed for the laying out of Moray park and the lower part of the new town begun early in the present century (KIRKWOOD, *The Four Successful Plans, etc.*, fol., Edinb., 1816); designed 1810 the lunatic asylum, Morning Side, enlarged 1839 by W. Burn, and 1856 by D. Bryce; and 1811-14 S. George's church: the custom-house at Leith; and several other public buildings: in 1820 he competed for the national monument; and designed S. Salvator's college at S. Andrew's, the east wing completed 1831 at a cost of about £10,000, the stone obtained from near Glasgow; at the same time he made considerable additions to S. Mary's college. He was the last master of the king's works, or king's architect, in Scotland, an office abolished 5 April 1840. He died 20 March 1856, at Edinburgh, and was interred in the Dean cemetery.

REIGATE STONE, from quarries near Reigate, Reygate, or Rygate, in Surrey, which are described in ARCHÆOLOGIA, 1779, i. 149. The marl is an argillaceous limestone, pretty constantly found underlying the chalk; the lower beds contain a large intermixture of green sand, and form the coarse calcareous sandstone called "firestone", used as the chief building stone of the neighbourhood. Though dark-coloured when newly quarried it dries to a beautiful white, and is useful for quoin work. It was used by cardinal Wolsey at Hampton Court; in 1253 at Westminster abbey, 37 Henry III (FRANCA PETRA); and 1666-7 Reigate stone "commonly called firestone" for hearths and backs of chimneys was charged 16d. per ft.; blocks to set up coppers, each 3 ft. by 1 ft. 6 ins., and 8 or 9 ins. thick, at 6s. 8d. each. BUILDER *Journal*, 1854, xii, 567; 1856, xiv, 361. PAVEMENT. FIRESTONE. 4.

REIGNIER WORK. The productions of a cabinet-maker named Reignier, of the time of Louis XIV, who varied them by employing two kinds of wood instead of brass and tortoiseshell (BUHL or BOULE WORK), and usually selecting tulip wood and a darker variety. Other materials have been used by later manufacturers. 1.

REIMS and RHEIMS. (Anc. Duracortum, Duraconorum, or Durocortorum Rhemorum; the metropolis of the Remi). The capital of the département de la Marne, in France; and situated on the river Vêle. The ancient porta Martis (Corinthian), disused since 1545, is usually supposed to have been erected by Agrippa, *cir.* B.C. 25, in honour of Augustus; the middle arch is 16 ft. wide and about 37 ft. high; since 1852 it has been well restored. NODIER, 2 pl.; DE LA BORDE, pl. 111-5; LENOIR, in DALY, *Revue Gén.*, 1841, ii, 232 (xxvi, 141), assigns it to the time of the emperor Julian, A.D. 361. A vaulted chamber with paintings was discovered 1738. The house No. 9 place des Marchés, XV cent.; maison des musiciens, rue du Tambour, XIII cent., VIOLLET LE DUC, *Dict.*; VERDIER ET CATTOIS, *Arch. Civile, etc.*, 4to., Paris, 1855-57, i, p. 17-26 and pl.; house of the comtes de Champagne; and court of the hôtel de la Renaissance, rue de la Marc, are both in NODIER; the house of the family Féret de Montlaurent, built *temp.* Henry II, has a court with arcades on coupled columns, between the arches are niches and statues. The *place* Louis XV, 1756-62 was laid out by the engineer Le Gendre; ENCYCLOPÉDIE, *Arts et Métiers*, Architecture, i, pl. 22; PATTE, *Monumens*, fol., Paris, 1767, p. 173-7; who gives the bronze statue, etc., to Louis XV by Pigalle, replaced 1819 by one by Cartellier; there is another 1619 to Colbert, born in the town; and another 1849 to marshal Drouet d'Erlon.

Reims is the metropolitan see of France. The cathedral, one of the finest in that country, dedicated to Nôtre Dame, was founded about 400 by S. Nicaise. A third church was built *cir.* 814-40 (827), by Romuald, architect to king Louis, and completed at end of X cent.; burnt 6 May 1210, the choir was commenced 1212-40 (by Jean de Coucy, INSTITUT DE FRANCE, *Rapport hist. sur les progrès des beaux arts en France*, 1789-1809, made by order of Napoleon, p. 165), being consecrated 1215; the apsidal chapels were perhaps designed XIII cent., by P. de Corbie, as given in WILARS DE HONECORT, *Album*, *cir.* 1230-60, pl. 59, 60, 62. CERF states that the edifice was commenced 1240 by H. Libergiers, carried on 1270 by R. de Coucy, (Jean d'Orbais was engaged in XIII cent.); and continued to 1295, and at intervals to 1430; it was to have had seven towers and spires. The vaulting and portails, etc., were carried out by Gaucher of Reims during eighteen years; and by Bernard of Soissons, who, working during thirty-five years, executed five vaults, etc., and the rose window, which is over 40 ft. diam.; in the west front, commenced and carried on for twelve years by Jean Leloup, "one of the most complete and magnificent specimens of mediæval iconography (600 statues) and conventionalised foliage" (KING), was completed between 1295-1300; a tower not finished until 1460; the west towers 267 or 270 ft. high, roofed 1515. "The north entrance of earlier date than the west, is of greater interest to the practical student" (KING). The façade was restored by 1852 except the south tower. The south portal rebuilt 1501; north gallery 1506. A new roof was completed 1487 after the fire in 1481, when four towers were lowered to the roof, the eastern flèche alone remaining. The MAZE with its four architects, is given in GAILHABAUD, *Arch. du Vme.*, ii; the

high altar reconstructed 1550-58 by Poncelet Paroissien was destroyed 1747 (Tarbé). Fine stained glass of XIII cent. In 1875 it was decided to commence the needful restorations at an estimate of several millions of francs: in 1877 £80,000 was voted towards it.

Drawings for this edifice, known to be before 1270, show the use of axial lines; two are given in Didron, *Annales Arch.*, v, 92; it is said to have been set out with the French perch (Gwilt, *Encyc.*, 1876, p. 1016). PROPORTION. The interior dimensions are given by King as 453 Engl. ft., nave 44 ft.; with ailes 99 ft.; and 125 ft. high; the dimensions usually given greatly vary. King, *Mediæval Arch., etc.*, 4to., London, 1858-68, iii, 9 pl. *Le Moyen Age Pitt.*, pl. 127. De la Borde, pl. 155; 163. Viollet le Duc, *Dict.*, as in Index. Building News *Journal*, 1865, p. 596, 664, 698. Tarbé et Maquart, *N. D. de R.*, 2nd edit., 8vo., R., 1852. Cerf, *N. D. de R.*, 8vo., R., 1861, 2 vols. Maquart et Dauphinot, *Le trésor de la Cath. de R.*, with text by Cerf, 84 pl. phot. Bourassé, *Cath. de France*, 4to., Tours, 1843. Flodoart, *Hist. église Met.*, 4to., 1581. Povillon Piérard, *Descr. de l'église*, 8vo., 1823. Chapuy et Jolimont, *Cath. de France*, fol., 1826-31. *Le Moyen Age Mont.*, several plates. Hawkins, *Hist. of Gothic Arch.*, 8vo., 1813, p. 71-2. Chapuy, *France Mont.*, fol., Paris, 1842, pl. 91. Whittington, *Eccles. Antiq.*, 8vo., London, 1811, p. 154-80. Gilbert, *Descr.*, 8vo., 1817. Quaglio, S. E. view, large lith., 1827-8. Ramée, *Hist. de l'Arch.*, 8vo., Paris, 1843, ii, 343-9. Woods, *Letters*, 4to., 1828, i, 44-57-60. Almanach Hist. de R., année 1770, *Descr. de l'église*. Du Sommerard, *Album*, fol., 1838-46, ser. iv, pl. 2. Avice, *Sacre, etc., du roy Louis XIV*, 7 Juin 1654, fol., Paris, 1655; and that of Louis XVI, 11 Juin 1775, 8vo., Paris, 1775. Gailhabaud, *L'Arch. du Vme.*, 1858, i and ii. Inkersley, *Inquiry*, 8vo., London, 1850, p. 84. Saubinet, *Flore.*

The Benedictine abbey church of S. Remigius (usually S. Remi), founded 496; the tomb of Clothaire I. died 561, is in the crypt; walls 1041-49; supposed by Inkersley to be a copy of the early Romanesque church of N. D. de Vaulx at Chalons-sur-Marne; nave lined 1162; upper parts of nave and ailes and vaulting 1160-80; apse, choir, and south porch restored, and south transept rebuilt 1481-1506; repaired 1825-30 under Mazois; continued from 1838 under Brunette of Reims, and the church reconciled 2 Oct. 1842; Ecclesiologist *Journal*, 1842, iv, 192; and further about 1852. Painted glass of XIV cent. The marble and terra cotta paving was designed by Guy, a monk (Virloy). A pavement in a chapel on south side of the choir, described Building News *Journal*, 1874, xxvii, 428. The large tomb to S. Remi 1553, destroyed 1793, was reconstructed 1803, and again 1847; La Borde, ii, pl. 227, p. 39; Maquart, *Le tombeau, etc.*, fol., Reims, 1847. The height is 79 ft. 6 ins.; internal length 350 ft., by King, iii, 5 pl. Gailhabaud, *Arch. du Vme.*, ii; Joltrois, *Essai Hist.*, 12mo., R., 1843. Plan in Nodier. *Le Moyen Age Mont.* Whittington, 1811. The church of S. Nicaise; first stone 1229 by H. Libergiers, died 1263, continued to about 1296 by R. de Coucy, died 1311; it was ruined 1793. Its size is given as about 305 Fr. ft., by 135 ft., 95 ft. high; the columns 28 ft. apart (Marlot); and tower 250 ft. high. Du Sommerard, *Album des Arts*, 4 ser., pl. 2. Nodier. Cloister in *Le Moyen Age Mont.*, pl. 10. Howlett, East and west views in ruin taken 1801, engraved 1805. Hawkins, *Gothic Arch.*, 8vo., 1813, p. 138. Dallaway, *Anecdotes*, 8vo., London, 1800, p. 35. Intagliatura. Slit with two transoms to spire, Viollet le Duc, *Dict.* The church of S. Jacques dates from XII cent.; a chapel of S. Romain of Rouen, 1542 (Renaissance); Kugler, *Geschichte der Baukunst*, 8vo., Stutt., 1867, iv, 318; Berty, *Ren. Mont.*, ii. Plan, etc., in Nodier. Viollet le Duc, *Dict.*, viii, 308. *A Study*, in Builder *Journal*, 1866, xxiv, 21. Monasticon Gallicanum, *Prov. Eccles. de R.; Monastères de l'ordre de S. Benoit*, 4to., Paris, 1864. Jesuit church of S. Maurice, 1627. French Protestant church. New Romanesque church of S. André.

The *hôtel de ville* 1627, completed 1825 (Italian), contains the public library and the museum, in which latter is a marble sarcophagus of one block, 9 ft. by 4 ft., of Jovinus, the Roman prefect of Reims, converted to Christianity 366, and died 406: La Borde, pl. 102-3. The modern *palais de justice* (Doric). The *hôpital général* 1608, formerly the college of Jesuits, its chapel 1619, the library 1678 of which a side and the ceiling is given in Rouyer et Darcel, *L'Art Arch., etc.*, 4to., Paris, 1863-66, i, 97, pl. 89-92; Nodier gives four views of the Italian staircase. The *hôtel dieu* in the former abbey of S. Remy; the archbishop's palace, its chapel of about 1230 (Gailhabaud, *Arch. du Vme.*, i; Viollet le Duc, *Dict.*, ii, 439); and a fine hall with open timber roof XV cent.; the municipal school, report in Builder *Journal*, 1878, xxxvi, 814; a handsome theatre; baths and washhouses 1852; and hôtel de la préfecture 1854.

Marlot, *Metropolis Remensis Historia*, 1667. Anquetil, *Hist. Civile, etc., de la ville*, 12mo., Reims, 1756. De la Borde, *Monumens de la France*, fol., Paris, 1816. Gérusez, *Descr. hist., etc., de la ville*, 8vo., 1817. Daniell, *Hist. de toutes les villes de France*, 8vo., 1833. Tarbé, *Les sépultures de l'église S. Remi*, 8vo., 1842; *Trésor des églises de R.*, fol., 1843; and *Essai hist. sur les Rues et ses Mons.*, fol., 1844. Liberthais et Paris, *Toiles peintes, et Tapisseries de la ville de R.*, 32 pl., fol. and 4to., Paris, 1843. Armand, *Reims*, 8vo. and fol., Paris, 1846. Nodier et Taylor, *Champagne*, fol., Paris, 1843-57, besides the above references gives neighbouring edifices. *Buildings in R.*, Builder *Journal*, 1866, xxiv, 188; and *Architectural Congress at R.*, 1878, *idem*, xxxvi, 826. 1. 14. 15. 28. 50. 96.

REIN. The Fr. term sometimes used by English writers for the SPRINGER or springing stone of an arch or vault.

REINALDO or RENAUD; see Sousa (E. G.)

REINHARD (meister Johann), of Meissen, built 1415 the stadtkirche at Weissenfels. 92.

REINS (Nicholas Dymenge de); see Dymenge de Legeri. It has been supposed that Reims was meant.

REINSTORP (Heinrich), 1446 enlarged the Gotthards kirche at Brandenburg. 92.

REJOINTING; same as POINTING. (Fr. *rejointoyer.*) 1. 2. 4. 25

RELIEVE. (Fr. *dépouille*). The model or cast clearing itself out of its mould. 5.

RELIEVING ARCH. An arch formed over and curved with the moulded arch stones, as in mediæval architecture. A DISCHARGING ARCH may occur above it. The two terms are used indiscriminately by writers.

RELIEF (It. *relievo*; Fr. *bosse; enlevure; relief*); see ALTO RELIEVO or high relief; MEZZO or demi RILIEVO, work partly in high and partly in low relief; and BASSO RILIEVO, or low relief. STUCCATO. 14. 25.

RELISH or RELLISH. "The jetting over the upright of a building", as a balcony; the same as projecture; Moxon, *Mechanick Exercises*, Carpentry, 4to., 1693, p. 167. "The relish or cheats of the teazle tenons of the posts stand up within an inch and a half of the top of the raison" (or head timber), etc. Neve, *Dict.*, 1736, s. v. Beam.

REMI; Saint; see Remy.

REMIGIUS. A monk of the abbey of Fécamp in Normandy, was appointed by king William I of England, *cir.* 1070 to the bishopric of Dorchester; he transferred 1086 or 1088 the see to Lincoln, and commenced the cathedral there, of which the chief portion of the west front and of the towers appears to be his work; Giraldus Cambrensis states he "followed the plan of Rouen cathedral in everything". He died 7 May 1092. Wild, *Lincoln Cath.*, 4to., London, 1837, p. 3-5. 19.

REMINGTON BRIDGE, so called after its inventor J..... Remington, formerly of Stafford. It was another principle of the lattice bridge and was of timber. He erected one 150 ft. span, over the river Trent at Ingestre, on earl Talbot's estate; Illustrated London News, 1848, xiii, 7; Civil Engineer, etc., *Journal*, 1850, xiii, 263; Allgemeine Bauzeitung, 1851, 2nd series, pl. 397, for 436 ft. span. He died about the end of 1853 at Galveston, Texas; Builder *Journal*, xii, 12.

REMOVAL; see HOUSE MOVING; and MOVING.

REMUS; TEMPLE TO; see ROMULUS.

REMY and REMI; SAINT. (Anc. Glanum Livii.) A town situated in the department Bouches du Rhône, in France. The Roman works consist of the lower portion with vaulting and Corinthian columns of a triumphal arch of one opening, date unknown; and a handsome tomb about 50 ft. high, erected by Sextus to his parents; both given in DE LA BORDE, *Mons. de la France*, fol., Paris, 1816, pl. 35-6; 83-5. A subterranean aqueduct, 5 ft. high and 2 ft. wide, extends in the direction of Arles. There is a good modern (before 1840) hôtel de ville; and the *église majeure* 1820-27 by M. R. Penchaud; GOURLIER, etc., fol., Paris, 1825-50, iii, pl. 172. POWNALL, *Notices*, 4to., London, 1788, p. 81. MÉRIMÉE, *Le Midi de la France*. 14. 28. 50.

RENAISSANCE ARCHITECTURE. A term not included in Q. DE QUINCY, *Dict. de l'Arch.*, 4to., 1832, nor in the PENNY CYCL. of 1841; but in SUPPL. of 1846. It is usually understood to mean the period and thence the style, which sought to reproduce the forms of ancient Roman art, being a direct but unskilful imitation of a study of the antique remains and of the orders by the aid of Vitruvius and his commentators, and the systematizers of the art, such as Alberti, Palladio, Serlio, Vignola, and Scamozzi. Many writers include the works of some of these masters, thus extending the period much later, which later style is better known as ITALIAN ARCHITECTURE. Thus the term is meant to comprise the *steps* to a complete *revival*, not that revival perfected. The term has even been considered as properly *restricted to the later works*, after Bramante and Raffaelle, as explained in CINQUE CENTO STYLE (p. 94). "The Reformation brought about a new mode of thinking in every direction, in a revived study of the classics and Oriental literature. Every nation in Europe felt the force of the new intellectual movement in the XVI cent. According to national characters, the Renaissance styles differed as much as the Gothic products. The Italian Renaissance is only in certain forms like the French, which differs from all the others; whilst the Spanish cannot free itself from Moorish or Saracenic influences; and in England and Germany, northern clumsiness prevented for a long time a thorough understanding and appreciation of the new forms;" the following edifices are compared: the castle of Chambord, west façade of the Louvre 1510-78; gallery of Francis I at Fontainebleau; entrance to the new chapel of the cathedral, and the principal staircase 1504-14 of Santa Cruz hospital, both at Toledo; town hall at Cologne 1556-9; castle at Heidelberg 1544, 1601-7; and Wollaton house 1580; by ZERFFI, in BUILDING NEWS *Journal*, 1874, xxvii, 747.

"Bramante and his still more distinguished pupil Raffaelle, introduced in their architectural designs that union of perfect grace and simplicity which inclines me to assign the very beginning of the XVI cent. as the date of the greatest perfection of the Renaissance school; when modern architecture may, perhaps, be said to have attained a degree of excellence which has never been since exceeded. Among the most notable examples of this very remarkable but short period may be named the Loggie of the Vatican, the palazzo of the Cancelleria, the palazzo Pandolfini, and a few other buildings which might be classified as specimens of matchless purity of design"; SMIRKE, *Lecture*, 1861, BUILDER *Journal*, xix, 137-8.

A notable fact in the history of the Renaissance was the marvellous aptitude of most of the artists of that epoch to practise in all the branches of the fine arts, and that with a success so complete that it was difficult to class them in order of merit. 1. 14.

GAILHABAUD, *Monuments anciens et modernes*, 4to., Paris, 1842-52, iii, gives church of S. Francesco at Perugia; of the Certosa near Pavia; basilica of S. Peter's at Rome; churches of S. Zacaria and of the Redentore at Venice; the churches at Gisors, Vétheuil, S. Etienne du Mont at Paris; cathedral at Auch; woodwork in that at Evreux; palazzo Strozzi at Florence; houses at Rouen; hôtel de ville at Cologne, nuovo procurazione and library of S. Marco, both at Venice; loggia dei Lanzi at Florence; château de Chambord; château d'Azay le Rideau; fort S. Andrea at Venice; tomb of the cardinals d'Amboise at Rouen; of the doge Vendramini at Venice; and of Louis XII at S. Denis. This chapter is followed by "monuments of XVII and XVIII cents."

General Publications. FERGUSSON, *History of Modern Styles*, 8vo., 1862. VERDIER ET CATTOIS, *Arch. Civile et Domestique au Moyen Age et à la Ren.*, 114 pl. 4to., Paris, 1855-57. MICHELET, *Renaissance, etc.*, 2 vols., 8vo., Paris, 1855. GAY, *Glossaire Archéologique du Moyen Age et de la Ren.*, 1200 cuts, 2 vols., 8vo., Paris, 1880. WORNUM, *Catalogue of Ornamental Casts: the Ren. styles;* at South Kensington Museum, 8vo., London, 1854. PATER, *Studies in Art and Poetry*, 2nd edit., 1877. WYATT AND WARING, *Ren. Court at the Crystal Palace*, 8vo., London, 1854. O. JONES, *Grammar of Ornament: Renaissance*, fol., London, 1856. EDINBURGH REVIEW, July 1864, p. 71. HUMPHREYS, *Art of Printing*, 100 pl., fol., London, 1867-8, gives various plates of Ornament (1521, etc.) in title-pages. DALY, *Revue Générale*, Index, s. v., 4to., Paris, 1840-73, p. 178-9. SEROUX D'AGINCOURT, *Hist. de l'Art*, fol., Paris, 1823. NOHL, *Tagebuch einer Italienischen reise*, 8vo., Stutt., 1866. DU SOMMERARD, *Les Arts au Moyen Age, etc.*, fol., Paris, 1838-46. Q. DE QUINCY, *Vie des plus célèbres Architectes*, 8vo., Paris, 1830. ROGER SMITH, *Architecture: Gothic and Renaissance*, 8vo., London, 1880. TYRWHITT, *The Cinque Cento, a Renaissance period*, BUILDING NEWS *Journal*, 1873, xxv, 723; *Principles of Ren. Arch., idem*, 1877, xxxiii, 169. DEWAR, *The Capabilities of the Ren., idem*, 1881, xl, 95; 147.

The following descriptions of the style in each country should be considered with those contained in the article ITALIAN STYLE OF ARCHITECTURE treating of the same period. ORNAMENT.

Italy. The first use of the Italian term is stated to be by VASARI with regard to the sculpture of the times of Giotto (1276-1336), "quella prima età della sua rinascita"; *Vite*, 1550, 8vo., Flor., 1846-57, iii, 10. The Italian *rinascimento* and *risorgimento* has been divided into the Early Renaissance, extending from the Pisan period 1063 (Busketus and Rainaldus), to the middle of the XV cent., and the Complete Renaissance, extending from 1450 to the death of Raffaelle in 1520. Pisa played a most important part in the early art history of the peninsula; Lucca and Florence vied with that city. Nicolo Pisano (1206-78) arose 200 years later; Ghiberti followed (1381-1455). During the prevalence of the mediæval style, a homely imitation of Roman architecture had always subsisted, evidenced now and then in some single example, and then again subsiding. Brunellesco was the first to study it, and assimilate his Italian to the Romanesque, obtaining breadth of style, with a cautious use of ornament. But others united the Italian to somewhat of Gothic feeling. The *trecentisti* from 1250; the *quattro centisti*, developed into the pure STILO CINQUE CENTO before 1475 lasting until 1550, or the *risorgimento*, the most graceful and noble form of that school known as the Renaissance and Revival, in which art was raised to a high point of excellence. It then passed into the ITALIAN STYLE (also called Renaissance by some writers), and at last yielded to the *bizarre, barocco*, and *rococo* at the end of XVII cent.

The first stone of the duomo at Florence laid 1298 is regarded by many as the foundation of the revival, and the movement itself is divided into three schools which almost simultaneously expired. The Florentine 1400-1600 founded by Brunellesco (1377-1446). The Roman 1470-1607, first dominated by the Florentines, was succeeded by Bramante (1444-1514), and A. Sansavino (1460-1529), as leaders of the pure cinque cento style; and Raffaello Sanzio (1483-1520); and the Venetian, 1500-1597 or 1520-1616, or even 1530, led by the family of the Lombardi, was carried on by M. San Michele; J. (Tatti) Sansavino, etc.; to these succeeded the school of masters.

Renaissance in Rome: 1st period 1400-1506, nothing done before Alberti 1450; 2nd, 1506-1561 Bramante; 3rd, Transition

decadence 1561-1602 M. A. Buonarroti; 4th, Decadence 1602-*cir.* 1700 Carlo Maderno; 5th, Imitation and Indecision, *cir.* 1700-1830 and later, C. Fontana, etc.; LETAROUILLY, *Rome Moderne*, fol., Paris, 1840, p. 131-40.

Besides the *edifices* named s. v. Cinque Cento style, may be stated: the cappella de' Pazzi in the outer cloister of Sta. Croce at Florence 1420 by Brunellesco, thought to be the earliest specimen. The octagonal sacristy of Sta. Maria Maggiore at Bergamo, erected 1430 according to an inscription; church of S. Pietro at Chivasso, dated 1425. Other examples are, the churches of Santo Spirito and of S. Lorenzo; the little chapel degli Angeli, and the Pitti, Strozzi and Riccardi palaces, all at Florence; Sta. Maria Formosa at Venice; S. Francesco and S. Benedetto at Ferrara; S. Sisto at Piacenza; loggia del Consiglio at Verona with SGRAFFITO WORK; SS. Annunziata at Florence; rotunda of the choir, and S. Francesco at Rimini, by L. B. Alberti; octagon chapel in the duomo at Lucca, of marble and richly adorned 1484 by M. Civitali, a beautiful specimen of the style, harmonising perfectly with the Gothic structure; the palazzo San Giorgio, later Cancelleria Apostolica, and other edifices at Rome by Bramante Lazzari; Pavia cathedral begun 1488; the certosa near Pavia, façade begun 1473 by A. da Fossano; Sta. Maria della Campagna at Piacenza; Sta. Maria del' Umilità at Pistoja; the Madonna della Steccata at Parma; palazzo Pandolfini at Florence, begun 1520 by Raffaello Sanzio; Sta. Giustina at Padua, by A. Briosco; Sta. Maria in Carignano at Genoa 1555; and the churches 1632 Sta. Maria della Salute, by Longhena; with S. Giorgio Maggiore; and 1576 il Redentore; all at Venice, the two last by A. Palladio.

SYMONDS, *R. in Italy; the Revival of Learning; the Fine Arts*, 8vo., London, 1877; BUILDING NEWS *Journal*, 29 Oct.; BUILDER *Journal*, xxxv, 576-7. SMIRKE, *Introduction of R. in Italy*, B. *J.*, 1860, xviii, 66-7; and 1861, xix, 136-8. BARRY, *Italian Renaissance, idem*, 1878, xxxvi, 231; and 1879, *Late Gothic*, 171; *Early Ren.; Brunelleschi*, 219; *Bramante and Sansovino*, 245; and *Palladio and Vignola*, 274: also in B. N. *J.*, 1878, xxxiv, 236; and 1879, xxxvi, 220, 262, and 285; *Florentine Renaissance, idem*, 1878, xxxv, 708. BROWNING, *Art Revival in Italy, idem*, 1874, xxvi, 583; xxix, 474. SELVATICO, *Arch. in Venezia*, 8vo., Venice, 1847, p. 155, 237. RUSKIN, *Stones*, 8vo., London, 1851-53; iii. WARING AND MACQUOID, *Architectural Art in Italy, etc.*, fol., London, 1850, pl. 19-43. SCHÜTZ, *Die R. in Italien; eine Sammlung der Werthvollsten erhaltenen Monumente in chron. Folge geordnet*, fol., Hamb., 1878-80. WARING, *Some of the earlier Architects of the Ren., especially Michelozzo;* BUILDING NEWS *Journal*, 1872, xxii, 73. LETAROUILLY, *Rome Moderne*, fol., Paris, 1825-49-55-60. GAYE, *Carteggio*, 3 vols., 8vo., Flor., 1839. DELLA VALLE, *Lettere Sanesi*, 3 vols., 4to., 1782-86. KUGLER, *Geschichte der Baukunst*, vol. 5, 8vo., Stutt., 1867, by BURCKHARDT AND LÜBKE. BURCKHARDT, *The Civilisation of the Period of the R. in Italy*, transl. by S. G. C. Middlemore, 2 vols., 8vo., London, 1878. TIMBER, *Der Ren. in Italien.*

In France, the real *style de la Renaissance* dates at least from the introduction 1495 of a colony of Italian artists by king Charles VIII, which led to the transitional period of Louis XII (1498-1515), with its elliptic arches, delicate arabesques mixed with rather Gothic details, and the use of brickwork and stone. (ITALIAN STYLE). Its continuation, the STYLE FRANÇOIS PREMIER, is best exhibited at Blois, Chenonceaux, and Chambord, *i.e.*, strictly Francis I (1515-47), with the church of S. Eustache, and the hôtel de ville, both at Paris; and 1552 the chapel at the château d'Anet. The term Renaissance is continued by some French writers into the neo-classic works by Lescot, Goujon, and Bullant. DE CAUMONT, *Abécédaire*, 8vo., 1850, p. 406, makes the first period (with arabesques) endure till the accession of Louis XIII; and the second, without them, until the end of that reign 1610-43, and even till 1658. DUSSIEUX ends the style about 1555-1642. RAMÉE makes it die with Henry IV, 1610, or very little later; "sous Louis XIII et Louis XIV se fait une réaction". Another writer gives two distinct periods: 1st, middle of XV cent., to reign of François I; and 2nd, from 1527 ending with Henri III, 1589: the first at Tours, the second at Paris, thus:—

1460 1540, Châteaux of Touraine.		1540-1572, Goujon	Sculpture.
1540-1580, Bullant	Architecture.	1542-1598, Pilon	
1540-1580, De l'Orme		1460-1520, Fouquet ...	Painting.
1542-1578, Lescot		1475-1584, The Clouets.	

The edifices are Chambord, Ecouen, Anet, Old Louvre, Chenonceaux; with the three Graces of Pilon: Gideon's fleece; and Henri II on horseback; PATTINSON, *Renaissance of Art in France*, 2 vols., 8vo., London, 1879; and BUILDER *Journal*, 1879, xxxvii, 560; 983. The works of the Renaissance in France might be considered in four divisions: 1, including those which are dependent, as Gaillon, upon arabesques and on colonnettes suiting the height of the windows; 2, embracing those which exhibit construction in stone with brickwork; 3, the edifices which are in stone and plaster or completely in stone, and, dispensing with the arabesques, employ the Italian orders; and 4, the structures exhibiting those orders upon a large scale, *i.e.*, embracing two stories, or not superposed, properly the ITALIAN STYLE. Great influence must have been exerted by the presence in France of Giocondo, *temp.* Louis XII, Vignola, Serlio 1541-52, and Primaticcio 1540-70, contemporary with whom were Gadyer, Nepveu, Jacques de Brosse, Bullant, Chambiche, Phil. de l'Orme, the Du Cerceaus, Goujon, Lescot died 1572, and Duperac.

Besides the edifices named s. v. French architecture, are, about 1530, the chateau de Madrid, Bois de Boulogne; and the house at Moret near Fontainebleau, both by François I; the latter, which was removed 1823 by the architect Biet to the Champs Elysées, is engraved in NORMAND, *Paris Moderne*, i, pl. 134-8; and DALY, *Revue Générale*, xxviii, 225. The church at La Ferté Bernard, in GAILHABAUD, *L'Arch. du Vme.* ii and iv. The edifices at Orleans, in COMMISSION DES MONUMENTS HISTORIQUES, *Archives*, fol., Paris, 1855, etc. Stalls in choir of Bayeux cathedral, 1589, by Jacques Lefebvre, BULLETIN MONT., xvii, 411, etc.; ROUYER ET DARCEL, ii, pl. 14-6, and pulpit and organ destroyed, xviii. The MONITEUR DES ARCHITECTES, 4to., Paris, 1852, xii, gives details of cathedral at Albi, pl. 122-8; 139-40; (also in ENCYCLOPÉDIE D'ARCHITECTURE, i, 1851); S. Etienne du Mont at Paris, x, pl. 109-18; S. Eustache at Paris, 1534-1640, pl. 135-8; and xxvii, pl. 314-8, église de Cergy, XVI cent.

The principal characteristics under the monumental view, are explained in the resumé in MAGASIN PITTORESQUE 1842, x, 121-8; and DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856, xxxix-lxiv. RIO, *Poésie Chrétienne, Forme de l'Art*, 8vo., Paris, 1836-55, i, 94; 119-24; 149-54; and London, 1854. CLARAC *Le Louvre et les Tuileries*, 8vo. and 4to. atlas, Paris, 1853. LÜBKE, *Geschichte der Renaissance Frankreichs*, 8vo., Stuttgart, 1871; *Review* in BUILDING NEWS *Journal*, xx, 294. DUCHESNE, *Les Antiquités, etc., des Villes, Chateaux etc. de France*, 8vo., Paris, 1609; 1668. PERRET, *Les Chateaux Historiques de la France*, 4to., Paris, 1879. BLANCHETON, *Chat. de France.* BERTY, *Les Grands Architectes Français de la R.*, 8vo., Paris, 1860. LE NORMANT, *Rabelais et l'Arch. de la R.*, etc., 4to., Paris, 1840. CAPEFIGUE, *François I, et la Ren.*, 8vo., 1845. BERNARD, *Recueil d'Ornements.* LACROIX, SERÉ ET DUCHESNE, *Le Moyen Age et la Ren.*, 5 vols., 4to., 1848. LEON DE LABORDE, *La R. des Arts à la Cour de France*, 2 parts, peinture, Paris 1850-55. BORDIER ET CHARTON, *Hist. de France*, 8vo., Paris, 1859-60, ii, p. 2; 4; 114., VERGNAUD-ROMAGNESI (*Chambord*) *Arch. du dep. du Loiret*, 8vo., Orleans, 1836-47, p. 43-7. DU CERCEAU, *Bastiments de France*, fol. Paris, 1576-1607. BERNIER, *Ville de Blois*, 1682. LE ROUGE, *Château de Chambord*, 1751. GILBERT, ditto, 1821. DE SAUSSAYE, ditto. MERLÉ ET PERIER, ditto. CALLIAT, *S. Eustache*, fol., Paris, 1850. LENOIR, *Arch. Franç. de la Ren.*, in DALY, *Revue Gén. de l'Arch.*, ii, 545-51, château de Gaillon. PALUSTRE, *La R. en France*, fol., Paris, 1879-81. BERTY, *La R. Monumentale en France*, fol., Paris, 1860-64. L'ANSON, *Ren. in France*, in CIVIL ENGINEER, ETC., *Journal*, 1845, viii, 157. *L'Association Nationale—les Arts en Belgique, La Ren. Chronique*

des Arts, etc., 4to., Brux., 1839-52. *Renaissance in France*, B. N. J., 1871, xx, 294. Penrose, *Influence of the Cinque Cento in the early French Renaissance*, B. N. J., 1874, xxvii, 5; 72. Cicognara, *Scultura*, fol., Venice, 1813-8, ii and iii, and E. David, *Discours sur la Sculpture en France*, 8vo. Le Moyen Age Pittoresque, fol., Paris, 1837. Le Moyen Age Monumentale, fol., Paris, 1843-47. Callat et le Roux de Lincy, *Hotel de Ville*, Paris, fol., 1844. Penor, *Fontainebleau*, fol., Paris, 1863. Sauvegeot, *Palais, Maisons, etc., xv au xviii siècle*, fol., Paris, 1867.

In England, the early renaissance or revival is better known under the names of Elizabethan and Jacobean architecture. Its introduction dates perhaps from about 1506 or 1516, after the Tudor style, lasting until 1649; when it was succeeded by the Italian style, under Inigo Jones, Sir C. Wren, and others. English Architecture. Italian style. The articles above quoted give detailed lists of edifices, architects, and publications, from 1506 to about 1640, to which may now be added Barry, Lecture, *Ren. in England*, Builder *Journal*, 1878, xxxvi, 257-60.

In the *German* states, the Renaissance (*Bauart des wiederaufblühens* or *des wiederauflebens; wiedergeburt der Romischen architectur*), was developed 1544, 1601-7 at the castle or palace of Heidelberg (l'Anson, at Inst. of Brit. Architects, *Sessional Papers*, 1856-57; Ramée and Penor, *Monographie*, fol., Paris, 1859); 1520 the palace at Freising; later, the palace at Landshut; and later, the castle Trausnitz also at Landshut; 1544-53 the castle at Breig; the hall at Cologne 1571 (Lubke, *Hist. of Art*, transl., by Bunnett, 8vo., London, 1868, ii, 141); 1553 at Innsbruck; 1553-70 castle at Stuttgart; *cir.* 1575-1616 the old palace at Munich by P. Witte; cloth hall at Brunswick; 1574-8 the great halls at Rothenburg; 1556 at Leipsic; 1600 at Nuremberg; 1575 works at Colmar; 1605 zeughaus at Dantzic; 1559 council house at Leyden; quadrangle of the castle of Schalaburg; 1609-15 church of the Jesuits at Coblentz, bold vaulting; and of the Carmelites 1659.

Kugler, *Geschichte der Bauk.*; *Ges. der Deutschen Ren.*, by Lübke, in vol. v, 8vo., Stutt., 1872, is very complete. Demmin, *Recherches sur la priorité de la R. de l'Art Allemande. Faiences du xiii siècle*, 12mo., 1862. Arnold, *Die Ren. Musterbuch*, etc., fol. Leipzig, 1860, etc. Keller, *Classical Works of the Arch. of the Middle Ages and Renaissance in Germany*, fol., 1879. Scheffers, *Deutsche Renaissance*, 69 pts., fol., Leip., 1880. Schmitz, *Niederlandische Renaissance*, fol, Berlin, 1880. Semper and Barth, *Ren. etc.*, 27 pl., Dresden, 1880. Raschdorff, *Bauk. der Ren.*, 65 pl., Berlin, 1880. Neumann, *Die Barockbauten Wiens*, xvii und xviii jahr., Wien, 1880. Eitelberger von Edelberg, *Quellenschriften für Kunst, etc., des Mittel. und der Ren.*, 8vo., Vienna, 1871, etc., 14 vols. *German Study of Italian Art*, Builder *Journal*, 1879, xxxvii, 1192.

Denmark; 1610 the destroyed (1859) castle of Fredericksberg, near Copenhagen.

Holland, etc.; see Dutch architecture. Town hall at Antwerp; church of S. Anne at Bruges. Flemish Architecture.

Russia, etc.; see Russian architecture; Moscow; St. Petersburg. *Renaissance Style in Eccles. Arch. in Russia*, 1689-1858, in Builder *Journal*, 1878, xxxvi, 55.

In *Spain; plateresque style* (*el plateresca*) also called Berruguete style after Alonso Berruguete (1480-1561). Italian architecture. *Stilo* Herreresco; Churriguresque style. Spanish architecture. Llaguno, *Noticias de los Arquitectos*, etc., 4to., Madrid, 1829, i, 173, (135; 181) puts the Renaissance, in Spain one hundred years before Brunellesco (1377-1444). The memory of Henrique de Egas is chiefly preserved by the fact of his having been the first of the Spanish architects to exhibit 1504-14 a knowledge of Italian art (*greco-romana*). The transitional works from the Pointed style after 1461 are noticed in Italian architecture (p. 64), to about 1521 in the cloisters of the *colegio mayor* at Salamanca, by Ibarra, which is entirely Renaissance; 1523 the *capilla* del condestable in Burgos cathedral by D. de Sagredo; 1527 the palace at Granada by P. de Machuca; the cathedral 1529 at Granada by D. de Siloe; 1531 the capilla de los reyes nuevos by A. de Covarrubias, and other edifices at Toledo; 1542 the hospital of S. Juan Bautista by Bustamente. It may be noticed that D. de Rianno designed in the three styles. Street, *Gothic Arch. in Spain*, 8vo., London, 1865, mentions as among the edifices of merit, S. Esteban, and the dome of the cathedral, at Burgos; cloister at Santiago; tomb in S. Tomàs at Avila; in Sigüenza cathedral; in Figueras cathedral; in collegiata at Manresa; at Lerida; 1551 town hall and 1560 casa Zaporta at Zaragoza; at Veruela, and at Pamplona. The cathedral at Malaga; town hall at Seville; 1563-79 the Escurial; and the Alcazar at Toledo, are also of note.

Escosura and Ville Amil, *España Artistica*, fol., Paris, 1842-59. Waring and Macquoid, *Arch. Art in Spain*, fol., London, 1850, gives pl. 52-9, details at Zaragoza, Seville, Burgos, Toledo, etc. Carderera y Solano, *Iconographia Española*, fol., Madrid, 1855-64. Spanish Government, *Monumentos Arquit.*, fol., 1859, in progress.

In *Portugal;* convent at Mafra. Lisbon. Portuguese architecture.

RENARD (Benedictus), Polonus, 1712. A name which appears on some architectural drawings in the royal library at Windsor.

RENARD (Bruno), born 33 Dec., 1781 at Tournay; a pupil of C. Percier; designed 1820 the Doric portico to the concert hall in the place du parc; 1840 the convent de Dames de S. André opposite the church of S. Nicholas; the fabrique de tapis, (Goetghebuer, *Choix des Mons.*, fol., Gand, 1827, pl. 76), and many houses, all at Tournay and in the environs; with the establishment of the houillières de Hornu, near Mons, which has also 200 workmen's houses; and *cir.* 1842-52 restored Tournay cathedral. As professor he published *Cours de Dessin* [illegible], etc., Tour., 1827; and he was architecte de la ville, etc. The date of his death has not been found. Weale, *Handbook to Belgium*, etc., 8vo., London, 1859, p. 84. Stephens, *Flemish relics*, 8vo., London, 1865.

Jean Baptiste Christian Bruno Renard, published *Monographie de N. D. de Tournay*, 8vo., Tour., 1852; *La Belgique Monumentale*, with Moke, 8vo., 1840; and other works.

RENARD (Jean Augustin), born 1744 at Paris, was a pupil of D. le Roy and of Le Carpentier, and of the painter Hallé. Gaining 1773 the *grand prix* he went to Rome, where he made many views for the illustrations to S. Non, *Voyage Pitt. de Naples, etc.*, 5 vols., fol., Paris, 1781-6. His chief designs are, 1778 the glass and iron roof of the salon d'exposition at the Louvre (also attributed to Max. Brébion); the two large stables for king Louis XVI at Sèvres and at S. Germain en Laye; restorations 1786-93 with Brébion of the buildings of the observatory at Paris; interior decoration of the hôtel d'Orsay, rue de Varennes; and that of the cardinal prince de Bénévent, rue d'Anjou; a gallery added to the ancien hôtel des relations extérieures, rue du Bac; and the restorations at the château de Valençay, where 1805-6 he designed a pavilion, assembly room, bridges, etc.; given in Krafft, *Plus beaux jardins*, fol., Paris, 1809, i, pl. 9-16; which also, ii, pl. 5, gives *a garden* 1803 in the rue d'Anjou; and designed the pavillon Turc, salle de bains, etc., in the jardin d'Arminvilliers, for the duc de Penthièvre (Krafft, *Arch. Civile*, fol., Paris, 1812, pl. 93-6). He was 1784 inspecteur des bâtimens du roi; and 1785 des carrières, succeeding his father-in-law Guillaumot; member 1792 of the academy of architecture; after the revolution, architect du dép. de la Seine, inspecteur de la grande voierie, etc.; J. C. Bonnard was a pupil. He died 24 Jan. 1807. Lance, *Dict. Biog.* 110.

RENAUD or Reinaldo; see Sousa (E.G.)

RENAULT de Cormont; see Regnault.

RENCONNAUX (.....) of Metz, almost rebuilt of stone 1478-81 the wooden tower to the cathedral of S. Etienne in that city; the spire was completed 1801.

RENCU me fecit arpit. An inscription in the church of S. Philibert at Tournus, supposed to give the name of the architect (or benefactor) who constructed the nave. COMMISSION DES MONS. HISTORIQUES, *Archives*, fol., Paris, 1855-72, p. 11 of Tournus.

RENDER or RENDERING. The first coat (Fr. *enduit*;) of plaster in two and three coat work when done on naked brick or stone. The stuff used is similar to that for "laying" or the "pricking up" coat. PLASTERER'S WORK. PARGET. The church of S. Andrew by the wardrobe in London, was 1692 "built of brick finished or rendered over in imitation of stone"; WREN, *Parentalia*, p. 309. "Dead harled" is a northern term for rendering. The quantity of materials used for each sort of work; for each yard super., is noted in HURST, *Handbook of Formulæ*, 12mo., London, 1865, p. 207.

Chappe is the Fr. engineer's term expressing the rendering, of cement, mortar, asphalte, or other material, laid on the extrados of an arch. QUATREMÈRE says *enduit* includes *crepis* pricking up, and *enduit*, rendering, and set coats; *gobetage* being the first coat. VIRLOYS says *chemise* includes *crepis*, *gobetage*, and *enduit*. The processes may differ from those of the English. 1.

RENDER SET. Two coat work on naked brick or stone. "Rendered and floated" is sometimes applied to three coat work on brick or stone.

RENDER FLOAT AND SET FOR PAPER. Three coat work on walls and brick nogging. The first coat being lime and hair; second, the same, but with more hair and brought to a level surface by being floated with a long rule; and third, fine stuff, mixed with a little hair, or fine sand, and laid on with a trowel.

RENDER FLOAT AND SET WITH FINE STUCCO FOR PAINT. The stucco is composed of fine stuff, and clean sharp silver sand in proportions to render the same hard and compact.

RENDERING. The name given in Ireland to the lime and hair-mortar used on the whole of the underside of slating, to prevent the slates rattling with the wind, and to prevent the wind, and rain, or snow, driving under them in exposed situations. Sometimes it is done only over part of the lath and slate, but this is not considered good work. It lasts as long as do the slates. TORCHING.

RENDERING CEMENT. A material for superseding lime and hair in internal plastering, which can be painted and papered on within twelve hours. It was manufactured 1861 by Barham of Bridgewater, who had also prepared a "rendering plaster".

RENGES. The "chayrs and seges and iiij renges" for Bodmin church, Cornwall, were to be made 1491 like those in S. Mary's church at Plympton. IMITATION.

RENIÉ (ANDRÉ MARIE), born 1789, was a pupil of Percier and of Vaudoyer. His most important designs are, the palace (Gothic) of the duke of Saxe Cobourg Gotha, with its theatre; the interior restoration of the palace (Schloss) of the duke of Saxe-Meiningen; and 1828 the entrance to the école polytechnique, Montagne Ste. Geneviève; NORMAND, *Paris Moderne*, 4to., Paris, 1845, ii, pl. 128. He was subinspector of the works of the palais du Temple, and of the hôtel of the minister of finances. The date of his death has not been met with. 110.

RENNES (Anc., Condate Rhedonum; a chief town of the Redones, and in IX cent. the capital of Bretagne). A town in the department of Ille et Vilaine, in France, situated on the river Vilaine, over which are three bridges. The fire of 22-29 Dec. 1720 destroyed one-third of the town; the façades of the new streets designed by J. GABRIEL, to whom the *places* Louis XIV and XV, completed 1744, are attributed; PATTE, *Monumens*, fol., Paris, 1767, p. 149. There is a bronze equestrian statue to Louis XV. It is the see of a bishop. The old cathedral dedicated to S. Pierre dated from 1179 to as late as 1679 (LANCE, *Dict. Biog.*, 1872, s. v., in Index, and T. Pibourt, N. Rabault, Tugal Carist, Corbineau, and F. Huguet, who were employed, thereon). It was begun to be rebuilt (Ionic) 1787 by M. Crucy continued 1811 and completed 1844. S. Sauveur (Doric), the best, was completed about 1728; S. Germain is the oldest; the église de Touissants dates 1624-57; S. Melaine has a Romanesque porch. The palais de justice (Italian), formerly le Parlement, 1618, by J. de Brosse, completed about 1654 by Courmeau, had the audience chamber, etc., decorated 1656-62 by C. Errard, Jouvenet, N. Coypel, and Ferdinand; ROUYER ET DARCEL, *L'Art Arch. en France*, 4to., Paris, 1863-66, i, 87, pl. 80-5; it was restored at an expense of £40,000. The hôtel de ville (Italian) after 1720, containing the public library of over 45,000 volumes, is by J. J. Gabriel, who designed the tour de l'horloge, and the cour du présidial. The préfecture by la Motte; episcopal palace 1672 occupying part of the abbey of S. Melaine; asile d'aliénés, *cir.* 1843 by P. N. F. Philippon; hôtel Kergus, formerly a school, now barracks; hôtel Blossac; railway station *cir.* 1840 by V. Lenoir; 1834-5 theatre, cost 600,000 francs, by C. Millardet (whose other works in the town are mentioned in DALY, *Revue générale*, 1847, vii, 312); it was burnt Feb. 1856; the arsenal 1844-6-66; a hospital after 1852; and the university 1849-55, should be noticed. MANET, *Essai top., etc., sur la Ville*, 8vo., Paris, 1838. NODIER ET TAYLOR, *Bretagne*, fol., Paris, 1845-6, i, 25, gives some old houses and the abbey of S. Georges: and buildings at Fougères, Redon, Vitré, with châteaux. JOANNE, *Itinéraire, Bretagne*, 1873, p. 85. OGÉE, *R. ancienne et R. moderne*, 3 vols., 12mo. R. (1850). TOULMOUCHE, *Hist. Arch. de l'époque Gallo-Romaine de la ville de R.*, 4to. R., 1847.

RENNIE (JOHN), F.R.S; F.S.A.; etc., born 7 June 1761, perhaps at Prestonkirk, in Scotland, studied at Dunbar and at Edinburgh; removed 1780 to London, and soon after 1791 carried out the Lancaster canal with its aqueduct over the river Lune (REES, *Encyclo.*). Besides very many other celebrated engineering works, he, between 1799-1803, designed and constructed the stone bridge over the river Tweed, at Kelso, of five elliptic arches, of 72 ft. span carrying a level roadway; NEALE, *Seats*, 4to., 1822, vi, s. v. Fleurs: stone bridges at Musselburgh, and other places in Scotland; *cir.* 1805 designed an iron bridge of one span of 181 ft. over the river Thames at Staines, RONDELET, *L'Art de Bâtir*, fol., Paris, 1830-2, 6th edit., pl. 159. 1804-7 the iron bridge at Boston over the river Witham, Lincolnshire, of one arch 85 ft. span, NICHOLSON, *Dict. of Arch.*; (the ribs cracked; CIVIL ENGINEER, ETC., *Journal*, 1844, vii, 126); a stone bridge over the river Earn, of three elliptic arches of 75 ft. span (CRESY); 1811 commenced Bell rock lighthouse, and published a work upon it 1824, (LIGHTHOUSE); and in London, 11 Oct. 1811-16, Waterloo bridge of nine equal elliptic arches of 120 ft. span and 35 ft. rise: Ralph Dodd urged that his plans, etc., were used for the Act of Parliament long before Rennie was employed; GENTLEMAN'S MAGAZINE, 1817, i, 482; ALLG.-BAUZ., 1840, ser. I, pl. 366: also 1814-9, the Trafalgar or Southwark bridge, of three cast-iron segmental arches, the centre one 240 ft. span, and two side ones 210 ft. each; 1817-9 Wellington bridge over the river Aire at Leeds, of one arch 91 ft. span; CIVIL ENGINEER, ETC., *Journal*, vii, 247: and the bridge at Stoneleigh, Warwickshire, 91 ft. span (CRESY). His design for London bridge was carried out by his sons; the first prize in the competition was gained by — Forbes, Feb. 1823. Rennie died 4 (not 16) Oct. 1821 in London, and was buried in S. Paul's cathedral.

Portrait and memoir in EUROPEAN MAGAZINE, 1821, lxxx, 404. DUPIN, *Notice Nécrologique* in l'Institut de France, 1821, A bust 1821 was in the collection of Benj. Gott, at Armley, Yorkshire. SMILES, *Lives of the Engineers*, 8vo, London 1861. CRESY, *Bridge Building, etc., with Life of Rennie*, fol., London, 1839; and *Encyc. of Civil Engineering*. 1833 *Sale Catalogue of remainder of Library* in Sir J. Soane's museum. 14

RENNIE (SIR JOHN), F.R.S., second son of the above, born 30 August 1794 in London, assisted his father at Waterloo and Southwark bridges; 1824-31 carried out London bridge of five elliptic arches, one of 152 ft. 6 in. span, two others 140 ft. and two 130 ft., on the completion of which he received the honour of knighthood. With his brother George, they 1832 designed and erected Staines bridge over the river Thames, of three stone

arches of 74 ft. and 66 ft. span; and 1826 the bridge over the Serpentine in Hyde Park, at an estimated cost of £36,500. His engineering works are numerous and celebrated. He died 3 Sept. 1874, at Bengeo near Hertford. BUILDER *Journal*, xxxii, 773. BUILDING NEWS *Journal*, xxvii, 331. *Autobiography of Sir J. Rennie*, 8vo., London, 1875; reviewed B. N. *J.*, xxix, 414. INSTITUTION OF CIVIL ENGINEERS, *Memoir*, xxxix, 273-8; and Indexes 1-30. ALLGEMEINE BAUZEITUNG, Ser. 1, pl. 366. CRESY, *Encyc.*; and *Bridge Building*, ut supra.

RENNIE (GEORGE), the eldest son, born 3 Sept. 1791 at Christchurch, Surrey, was after 1821 in partnership with his brother Sir John. In 1847 he carried out the bridge of five arches of 82 ft. span each, over the Meuse for the Liège and Namur railway, CIVIL ENGINEER, ETC., *Journal*, x, 349. He died 30 March 1866, and was buried at Holmwood near Dorking. BUILDING NEWS *Journal*, xiii, 223. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, i, 207; *Memoir*, xxviii, 610; and Indexes 1-30. ALLGEMEINE BAUZEITUNG, 1840, Ser. 1, pl. 366-7.

RENOLD me fecit, appears on the archivolt of the grand portail of S. Savin de Lavedan (Hautes Pyrénées (LANCE, *Dict. Biog.*, 1872.

RENOZ (B.....), rebuilt 1765 the church of S. André, on the *place* du grand marché at Liege; designed 1774 the hôtel de ville at Verviers (Ionic); and about the same period rebuilt the church of the Augustinians at Liege, on the boulevard d'Avroy.

RENT. (Lat. *Redditus*). The money or its equivalent periodically paid, in respect of lands or tenements held by one from whom the rent is due; or as defined by RICARDO, it is "that portion of the produce of the earth which is paid to the landlord for the use of the indestructible powers of the soil". GROUND; PEPPERCORN; QUIT; RACK; and RESERVED; RENT. LAND. APPORTIONMENT OF GROUND RENT. ENFRANCHISEMENT. IMPROVED GROUND RENT.

RYDE AND DONALDSON, *General Text-book*, 8vo., London, 1854. LANKTREE, *Elements of Land Valuation*, etc., 8vo., Dublin, 1853. HUDSON, *Land Valuer's best Assistant*, 8vo., London (1859). BAYLDON, *Art of Valuing Rents and Tillages*, 8vo., 1862. SCOTT, *Rents and Purchases, or Valuation of Landed Property*, etc., 8vo., 1879. WOODFALL, *Landlord and Tenant*, 10th edit., 1877. 14.

REPAGULA. Two bolts (*pessuli*) affixed to the back of the separate valves of a door, which shooting from opposite sides towards each other, secure the valves from being opened. A painting at Thebes represents their situation and action. CICERO, *Div.*, i, 34. PLINY, *H. N.*, xvi, 82. VERRIUS, *ap. Fest.*, s. v.

REPAIR. (Fr. *corvée* (slight); *entretien; maintenance*). Work that may be necessary to be done to a building to make good the results of age, wear, use, etc. 1545 "the reparacion" of Ripon bridge "when yt is begowne to be reparelled and amendid": "1545-6 to the reparelling of the churche"; SURTEES SOCIETY, *Fabric rolls of York Cath.*, 8vo., Durham, 1859, p. 351. It is of two sorts; substantial repair, as to the main walls, timbers, roofs, etc.; and ordinary repair, as to doors, windows, floors, etc. DILAPIDATIONS. The words "repair, maintain, support, and uphold" constitute one of the express covenants of leases of premises. RESTORATION. The cost of average repairs, is say 1 per cent. on cost of the building; or if old or badly constructed say 2 per cent.; as a general rule say 1¼ per cent. on the cost; BUILDER *Journal*, 1871, xxix, 953. One seventh of the rental of ordinary houses is often taken as a fair allowance. FLETCHER, *Dilapidations*, 8vo., Lond., 1872; and *On Quantities*, 8vo., London, 1879, describes the routine of taking the 'repairs' to a house; BUILDING NEWS *Journal*, 1873, xxiv, 722-3. *Repairs and restorations*, SCOTT, *Lectures*, 8vo., London, 1879, i, 363-4. *Repairs of Churches*, in BUILDER *Journal*, 1878, xxxvi, 1219; 1262. The canon of council 1322 at Oxford, gave injunctions for repairs of churches, for first time; the churchwardens are not named but are clearly intended. 25.

REPAIRING A FISSURE (Fr. *reprendre*). 25.

REPAIRING the FRONT of a house. A machine described in CIVIL ENGINEER, ETC., *Journal*, 1839, ii, 97. Glazier's HORSE. Dubbins' patent ladder scaffold; BUILDER *Journal*, 1872, xxx, 489. TRESTLE.

REPARATION; see REPAIR.

REPARATION NAIL, see LATH NAIL.

REPETITION. The art in design which gives to objects the most indifferent, as a little cube, a pearl, a leaf—a value and agreeable effect. Alternation is a repetition of two different figures and contrasted. ZIEGLER, *Recherches des principes du Beau dans l'Arch.*, etc.: DALY, *Revue Générale*, 1851, ix, 242-3. IMITATION. COPY. 25.

REPLUM. The term is supposed to mean the fillet or upright rail fixed in the centre of the frame of a doorcase, between the lintel and the sill, in order to serve the purpose of a rebate, and secure the junction of the two valves. An example from the temple to (Remus now) Romulus at Rome, is shown in DONALDSON, *Ancient Doorways*, 4to., London, 1833. VITRUVIUS, iv, 6, only once mentions the term. FORIS.

REPORT. The system of framing a military report is explained in AIDE MÉMOIRE, etc., 8vo., London, 1852, iii, 222.

REPOSE. That quality in a design opposed to violence or thrust. "Repose was the great sentiment which their (the Greek) architecture expressed; vertical pressure, the one physical condition it had to provide against; whereas arched architecture (as is said in India) 'never sleeps'"; SCOTT, *Lectures on Med. Arch.*, 8vo., London, 1879, ii, 137. "As architecture, so all the decorative arts should possess fitness, proportion, harmony; the result of all which is repose"; OWEN JONES. 25.

REPOSE; ANGLE OF, sometimes called the angle of friction. The utmost inclination at which a carriage will stand at rest upon a road or railway; and when upon the least increase of slope it is put in motion by the gravity of its weight; it consequently occurs when the gravity of the load and friction upon the road are equal. Upon a hard turnpike road, the angle is about 1 in 40. Upon a railway, the angle is about 1 in 250 or about 21 ft. in a mile, taking the friction at 9 lbs. per ton; or at 1 in 263½ or 20 ft. per mile at 8½ lbs. per ton. BREES, *Glossary*, 1853. INCLINE. GRADIENT. SLOPE of a cutting.

The angle of inclination, or slope, at which various soils and substances will stand naturally. SLOPE.

50 degrees. Compact earth.
45 Lime dust from a spout. Rubble. Clay, well drained. Soft stones on mortar fresh laid, when the centre of gravity does not fall without the base; Rondelet.
44 Fine flour when dry. Wheat flour, from a spout; sawdust ditto.
44 or 45 damp clay; *i.e.*, 1 to 1.
40 to 45 Large flints.
40 Malt and dry sand, both from spout; and wet quicksand from the river Thames.
39.16 Sand not very dry, from spout. Shingle.
38 to 35 Coarse gravel heaps.
37 Wheat and Malt, from spout, unground; common mould from spout.
36 to 35 Wet Thames gravel; common gravel.
35 to 48 Shingle and gravel, *i.e.* 1.43 to 1, to 0.9 to 1.
35 Coarse dry gravel. Peas from spout. Dry quicksand from Thames. Small flints; and very small flints approaching to sand, 35 to 34.
34 to 36 Hard stones with mortar fresh laid; Rondelet.
33.30 Dressed voussoirs commenced sliding without mortar; Rennie.
33 Fine gravel when dry.
32 to 33 Sand, dry.
30 Hard stones, dry, commenced slipping; Rondelet, iv, 273.
28 Vegetable earth.
26.44 Barley, dry.
25.30 Dressed voussoirs commenced sliding with mortar fresh laid; Rennie.
25 Wet earth.
24 Peas, dry.
21 to 37 Dry sand, clay and mixed earth.
14 to 17 Wet clay; *i.e.* from 4 to 1 to 3.23 to 1.
14 to 45 Peat, *i.e.* 4 to 1 to 1 to 1.

HASKOLL, *Railway Guide*, 8vo., London, 1848, p. 95-6, from Rennie. RANKINE, *Civil Engineering*, 8vo., London, 1864, p. 316. GREGORY, *Mathematics for Practical Men*, 8vo., London, 1862, p. 208.

REPOSITORIUM. A secret place in a temple for securing treasures. A recess in a thick wall of a church, secured by a

strong door to contain a reliquary. GUENEBAULT, *Dict. Icon.*, ii, 300. AUMBREY. MUNIMENT ROOM.

At Notre Dame de Bourg en Bresse, on the north side of the apse, is a sort of recess or niche, pierced to the exterior of a trellised window, the use of which is unknown. J. BARD considers it to be the *repositorium* of the ancient basilica, very frequent in Bourgogne; BAUX, *N. D. de Bourg*, 8vo., Bourg, 1849, p. 3. LOW SIDE WINDOW. 25.

REPOSOIR. A shelter. It consisted "of four low seats covered with slate or canvass to shelter from the rain, and four open seats to be covered with climbing plants, trained on open lattice, to defend from the sun: these seats surround a small court yard, to be kept locked, in which may be sheds for gardener's tools and other useful purposes", as proposed for Russell Square; REPTON, *Enquiry*, 8vo., London, 1806, p. 63; 75. One erected at Lyon by Sainte Marie Perrin, in DALY, *Revue Générale*, 1864, xxii, 230, coloured pl. 40-4. 25.

REPOUSSÉ WORK. The French term for ornamental metal work, formed in relief by punching the metal from the back until the required forms are roughly produced in relief upon the surface, when it is completed by chasing.

REPRYSES. "For working, karvyng and intaylling of 16 severalle frestones for the repryses of the kynges new hall", 1531 at Hampton Court. They were carved with arms, roses, 'porholos' and the letters H and R; as detailed in SUMMERLY, *Handbook;* and in BUILDER *Journal*, 1857, xv, 592. Probably roof corbels are meant.

REPTILE. Representations of reptiles more or less conventionalized were introduced into early mediæval art and sculpture during the Romanesque period especially. The term comprises the adder, serpent, snake, chamelion, tortoise, lizard, leech, crocodile, and toad. MONSTER.

REPTON (HUMPHRY), born 2 May 1752 at Bury S. Edmunds, resided 1775 at Aylsham; about 1788 was the first to adopt the professional title of "landscape gardener," succeeding to L. Brown, and occasionally acted as architect until assisted by two of his sons. He published among other works *Sketches and Hints on L. G.*, 4to. [1794]: *Letter to Uvedale Price, Esq. on the connection of L. G. and Architecture*, 4to., 1794; 8vo., 1795; and in 1798 by Price: *Observations on L. G.*, 4to., 1803; *Observations on the Theory and Practice of L. G.*, with a portrait of the author, 4to., 1805; two editions: *Inquiry into the Changes in Taste in L. G.*, etc., 8vo., 1806: *On the introduction of Indian Arch., and Gardening*, fol. 1808: *Designs for the Pavilion at Brighton* (not adopted), *and Inquiry into the Changes of Arch.*, by J. A. and G. S. Repton, fol., 1808: *On the supposed effects of Ivy on Trees*, in LINNEAN SOCIETY, *Transactions*, 1810, xi, 27: and *Fragments on the Theory and Practice of L. G.; and Remarks on Grecian and Gothic Arch.*, by J. A. Repton, 4to., 1816. LOUDON, *Repton's Landscape Gardening and Landscape Architecture*, 8vo., 1840, gives nearly all the above, with a *memoir* and a small outline portrait (reproduced in CIVIL ENGINEER, *etc., Journal*, iii, 52); LOUDON also wrote *Mr. Repton's mode of showing effects by slides and sketches*, in his *Treatise on Forming Country Residences*, 4to., 1806.

Repton drew many designs for ladies' souvenirs, etc.; and for twenty years furnished drawings for the miniature views of Seats in Peacock's *Annual Polite Repository*, which for eighteen years were engraved by John Peltro who died 5 Aug., 1808. His first chief landscape work was about 1791 at Cobham hall. "I gave general plans for the whole (house and grounds), with the assistance of my son only in the architectural department, as at Brentry hill; Cotham bank; Organ hall; Stapleton; Stratton park; Scarrisbrick; Panshanger; Bayham; etc."; LOUDON'S edit, 1840, p. 121, 284, 289, of *Observations*, 1803. The additions to Corsham house, Wiltshire, for Paul Cobb Methuen, esq., are claimed for his son J. A. Repton, who made the drawings whilst in the office of John Nash; BRITTON, *Toddington*, 4to., London, 1840, p. 21; 30. He altered the south front of Barmingham hall, near Cromer; and *cir.* 1795 produced volumes of designs for the disfigurement of Magdalen college, Oxford, and the disposal of its pleasure grounds; (BUCKLER), *Observations — on Mag. Coll.*, 8vo., London, 1823, p. 111.

He died 24 March 1818, and was buried in Aylsham churchyard near the porch, with a tablet in the wall adjoining. NORFOLK TOUR, 8vo., London, 1829, i, 176; 179. GENTLEMAN'S MAGAZINE, 1818, pt. i, 372, 648; pt. ii, 102; ANNUAL OBITUARY for 1819, iii, 285, 310.

REPTON (JOHN ADEY), F.S.A., eldest son of Humphry, born 29 March 1775 at Norwich, became a pupil of W. Wilkins, R.A.; and 1793-7 an assistant to John Nash, when he made the designs for the improvements at Corsham house, Wiltshire, after which (though deaf) he joined his father in Hare Street, Enfield, and assisted him in his works and publications of 1808 and 1816; as at Bourn house, Cambridgeshire, for G. J. West, earl Delawarr; restorations of the exterior of Cobham hall, Kent; and portions of Laxton hall, Northamptonshire, with the school house adjoining; laid out the grounds at Adlestrop park, Gloucestershire; gained 1809 the first prize for plans for public buildings to occupy Parliament Square, at Westminster; and 1812 the second premium of 100 guineas for New Bethlehem hospital, Lambeth. In 1821 he was consulted to improve a place near Utrecht in Holland; another at Arnheim in Guelderland; 1822 visited Muskau to assist prince Pückler Muskau; at Neu Hardenberg near Frankfort on the Oder, and at Glienicke near Potsdam, for prince Hardenberg; and restored Buckhurst, near Tonbridge Wells, for earl Delawarr. Frederick Mackenzie (died May 1854) was a pupil. His numerous literary contributions to the Society of Antiquaries and other societies, are named in GENTLEMAN'S MAGAZINE, 1861, x, 3rd series, p. 107-110. He lived at Springfield near Chelmsford, where 1842 he designed a chapel (GENTLEMAN'S MAGAZINE, 1843, p. 42), and died there Nov. 26, 1860, aged 86.

REPTON (GEORGE STANLEY), fourth son of Humphry, entered the office of John Nash about 1795. He designed the library at Cobham park, Kent; effected alterations at Kitley house, for for J. P. Bastard (ACKERMANN, *Repository of Arts*, 8vo., London, 1828, xi, 64); Follaton house for S. Cary (*idem*, xii, 63); and remodelled Peamore house, for S. T. Kekwich, all in Devonshire; 1818-20, with J. Nash remodelled the exterior façades of the opera house, Haymarket; and 1819-20 designed at a cost of £15,000 (Waterloo now) S. Philip's chapel, Regent Street, for his brother, revd. Edward Repton (died 6 Aug., 1860, aged 78); BRITTON AND PUGIN, *Edifices of London*, 8vo., 1825, i, 103. He married before 1818 lady Elizabeth, daughter of lord chancellor Eldon; retired from practice, and died 1858, it is said.

RERE ARCH; see REAR ARCH.

REREDOSE, reardosse; dosel, dossel, doser, and lardos or laordose (Lat. *dorsale, dossale, dorale, dorsile pallium*, and *dorsuale*, as s. v. DUCANGE, *Gloss.;* Fr. *arrière dos; retable;* Ital. *postergule;* Span. *retablo;* Ger. *hinterrücken*). A term now usually applied in England to the partition or screen behind an altar, by which the choir is separated from the presbytery, lady chapel, or retro-choir. "The front called the rerdos behind the great altar", 1389-90, at Exeter; BRITTON, *Cath. Antiq., Exeter*, p. 98. King Henry VII in his will directs a space of 8 ft. to be left behind the high altar at Eton college chapel. At Arundel, it is a plain stone wall about 7 ft. from the east window and 8 ft. high, and the passage or vestry thus formed is entered by a doorway through the wall at each side of the altar, as well as by a separate entrance or priest's door at the south end. It was composed of tabernacles, niches, and statuary, often of a very sumptuous character; of simple painted wall decorations in geometric patterns; the wall cut with ornaments in relief over its surface; and occasionally hangings of silk or tapestry hung over the wall forming a back ground to the altar decorations. "An altar screen or reredos is neither a necessary nor (except in some peculiar instances) a fitting ornament for a small church;" ECCLESIOLOGIST *Journal*, 1843, iii, 5-6; 33-7. 1849, ix, 121, 314. ALTAR PIECE. ALTAR SCREEN. RETABLE. RETRO-CHOIR. 2. 14. 17. 19.

Good ancient examples in England exist at York; Westminster; Durham; and Winchester cathedrals; Christ church, Hampshire, GENTLEMAN'S MAGAZINE, 1861, p. 550; S. Saviour's church, Southwark, 1520-8, its mutilated remains, with the restoration by R. WALLACE, 1830, are given in DOLLMAN, *The Priory Church*, fol., London, 1881, pl. 31-2, p. 21. S. Alban's cathedral, BUILDER *Journal*, 1849, vii, 582, 33 ft. by 40 ft. high, one of the four of the kind in England; NEALE, in ASSOCIATED SOCIETIES, *Reports and Papers*, 8vo., 1878, p. 126; which 1862, p. 225, names an old example at Sedgebarrow, Worcestershire. A reredos with figures remains at Somerton, Bampton, and Hanwell, in Oxfordshire; and an elegant one of three niches without figures at S. Michael's church, Oxford. The ancient painted retable or movable reredos formerly belonging to the high altar at Westminster abbey, probably by Italian artists and contemporary with the early days of Giotto, is given in SCOTT, *Lectures*, 8vo., 1879, i, p. 181. A very curious example was lately (1880) discovered in Adisham church, Kent. The reredos at S. Barnabas church, Nottingham, by A. W. Pugin, is of open work. Modern examples of the reredos are represented in BUILDER *Journal*; some are probably altar pieces.

1864, xxii, 864, Lichfield cathedral.
1865, xxiii, 466, Shircoaks church.
1867, xxv, 291, Christ church, Mayfair. 450, Boxgrove church, near Chichester. 823, Westminster abbey, with altar.
1868, xxvi, 731, Worcester cathedral. (See 1874.)
1870, xxviii, 664, Chichester cathedral.
1871, xxix, 139, Mosaic, for S. David's cathedral. 1024, S. Mary, Redcliffe, Bristol, and (1867, xxv, 171, not executed).
1873, xxxi, 147; 471, Gloucester cathedral. 906, S. Martin's church, Herne, Kent.
1874, xxxii, 10, Exeter cathedral (? taken down 1875). 228; 370, Worcester cathedral. (See 1868.)
1877, xxxv, 85, All Saints church, Cheltenham. 239, Salisbury cathedral.
1878, xxxvi, 1144, Trinity church, New York.
1879, xxxvii, 485 9, All Souls College chapel, Oxford. 802-5, S. Mark's church, Hamilton Terrace.

In BUILDING NEWS *Journal*.

1867, xiv, 296, Westminster abbey.
1873, xxiv, 530, All Saints church, Clifton. xxv, 721, Gloucester cathedral (Groups).
1874, xxvii, 58, S. Bartholomew's church, Armley.
1881, xl, 70, S. Martin's church, Brighton.

At Ludlow church, Shropshire, behind the third pointed reredos is a small ancient chamber with a lychnoscopic window. A similar ancient chamber is behind the reredos in Great Yarmouth church, Norfolk. REPOSITORIUM.

WEBB, *Continental Ecclesiology*, 8vo., London, 1848, remarks on several "reredoses", evidently including *retables* or altar pieces as;—the open one of stone in the *dom* at Augsburg (p. 134); of white marble with carvings, from which rises a vast calvary in S. Eustorgia at Milan (p. 209); an ancient painted reredos in the old sacristy in the *certosa* at Pavia (p. 224); in a south chapel in S. Donato at Murano (p. 309); another, behind the altar, in the baptistery at Padua (p. 259); where in S. Antonio, the altar has a low reredos wall behind it, with statues (p. 265); a magnificent Pointed reredos of white marble of nine canopied niches, in the Campo Santo at Pisa (p. 359); and of Carrara marble, very large, renewed by ... Antolini, in S. Francesco at Bologna. A most curious reredos (?) at Landevennec; MACQUOID, *Through Brittany*, 8vo., London, 1877, p. 317.

RIDGE, *On Reredoscs*, read at Architectural Association, BUILDER *Journal*, 1872, xxx, 320; BUILDING NEWS *Journal*, xxii, 332; CHURCH BUILDER *Journal*, 1872, p. 239-46. PULLAN, *The Altar; its Baldachino, and Reredos*, 8vo., 1874. WALCOTT, *Reredos and Decalogue*, B. N. *J.*, 1874, xxvi, 515. VIOLLET LE DUC, *Dict. du Mobilier*, s. v. Dorsal, 6 vols., 8vo., Paris, 1858-75.

Some of the results on the legality of the reredos are recorded in BUILDING NEWS *Journal*; at Lynton, 1871; Exeter, 1873-75; Daresbury, 1875; and Denbigh, 1875-76. BUILDER *Journal*; Exeter, 1874; Daresbury; and Denbigh, 1875; and S. Ethelburga, London, 1878. CHURCH BUILDER *Journal*, April, 1874, Exeter; also the GUARDIAN *Newspaper*, fol., 1874, p. 1060; the judgment, 1070-3.

It also meant a screen generally; as 1332, "100 beech boards 8 ft. long each to cover the soursadel reredos in the east gable", BRAYLEY AND BRITTON, *Palace at Westm.*, 8vo., 1835, p. 155: "Reredoses of timber" at Beauchamp chapel, Warwick; BRITTON, *Arch. Antiq.*, iv, 11: and "The reredos bearing the roodeloft departing the quier and the body of the church", King's College chapel, Cambridge. 1416-46 at Durham the "rerdosse" was the organ screen.

REREDOSSE. The open hearth upon which a fire was lighted, immediately under the louvre, in the middle of the ancient hall; TURNER AND PARKER, *Domestic Arch.*, 1853, ii, 39. Good examples occur at the hospital of S. Cross near Winchester; and at Penshurst, Kent. "The fuel placed against a sort of fireiron called a reredosse." Before chimnies were used, "each one made his fire against a reredosse in the hall, where he dined and dressed his meat"; HOLINSHED, *Chronicle*, fol., 1586, i, 188; and "ouens, harthes, reredorses, chimnies, ranges, and such instruments", are mentioned as in Henry VIII's lodging near the town of Guisnes.

RESASCO (G..... B.....), altered 1828 the round church of S. Sisto erected by P. Pellegrini; and 1843 renewed the façade of the deaf and dumb asylum; both at Genoa.

RESAUNT, see RESSAUNT.

RESEMBLANCE; see IMITATION and COPY.

RESERVED RENT. When on the granting a lease a rent is made payable thereout to the grantor.

RESERVOIR or baptistery, in Eadwin's plan xii cent. of Christ church monastery at Canterbury; WILLIS, in ARCHÆOLOGIA, June 1853.

RESERVOIR. A pond or lake containing a large body of water, usually formed in a valley by means of dams or embankments, as a means of supply for hydraulic works (FOUNTAIN); and the supply of water to a town. A reservoir is also formed on a summit when practicable, for the supply of water by gravitation to a town or series of houses. HUGHES states that the prices range from £268 to £722 per million cubic feet, caused by the variation in the shape of the valley; the deeper the valley the less will be the cost. Dams of masonry are more expensive than earthwork. Open reservoirs 15 ft. to 20 ft. deep do not generate confervæ; BATEMAN, at INST. OF CIVIL ENGINEERS, before 1876. BASIN, 18 ins. to 20 ins. deep. PANT, conduit, or reservoir. CISTERN. CONDUIT. RAIN WATER CISTERN. TANK. PISCINA. POND. LAKE. 4. 25.

RAWLINSON, *Report on Works at Burnley*, with diagrams, B. N. *J.*, 1864, xi, 451. LESLIE, *Liability of Reservoir embankments to failure*, B. N. *J.*, 1878, xxxiv, 126. *Embankments and Reservoirs, their failure and construction*, 1875, xxix, 134. *To construct an unfailing dam*, 1864, xi, 345. CLARK, *on Stone walls and embankments for reservoirs*, C. E., ETC., *J.*, 1848, xi, 196. *Constructed dams*, B. *J.*, 1864, xxii, 259-60. *Reservoirs and water supply*, B. *J.*, 1868, xxvi, 502-4; 534; 564-6. *A covered reservoir*, with diagrams, B. *J.*, 1880, xxxviii, 19 Feb. *Cement concrete for a reservoir*, B. N. *J.*, 1876, xxxi, 653-681; xxxii, 28. BAYER, *Discharge of Water from Reservoirs*, CIVIL ENGINEER, ETC., *Journal*, 1849, xii, 243, 261, 291, and 325. BRETON, *Les Barrages de retenue des graviers dans les gorges des torrents*, 4to., Paris, 1867. BELOE, *Construction of Catch-water reservoirs*, 8vo., 1872; B. N. *J.*, xxiii, 155-7. ANDERSON, *Earthen and Masonry Dams*, 8vo.

BATEMAN, *The Bann Reservoirs, county Down*, INSTITUTION OF CIVIL ENGINEERS, 1841, i, 168; vii, 251-86: and "*Waterworks*" in Indexes. D. MACKAIN, *Cast iron reservoir at Garnet Hill*, for Glasgow water works, 1843, iii, 139. Hallington for Newcastle, B. *J.*, 1871, xxix, 689. Grand Junction Canal reservoirs, in CIVIL ENGINEER, ETC., *Journal*, 1837, i, 69. Bradgate for Leicester, B. *J.*, 1872, xxx, 503. New Reservoir at Rivington for Liverpool, B. *J.*, 1875, xxxiii, 770.

Failure of a reservoir; at Cardigan, B. *J.*, 1875, xxxiii, 783. Bradfield for Sheffield, 1864, xxii, 250. Williamsburg, co. Mass., B. N. *J.*, 1874, xxvii, 282.

Storage reservoirs for retaining the excess of rainfall in wet seasons, have been advocated for Great Britain, to supply plenty of water in the hottest and driest weather to every house, cottage, or animal. JACOB, *On the designing and construction of Storage reservoirs*, 8vo., London, 1867. WOOD, *Tunnel Outlets from Storage reservoirs*, Inst. of Civil Engineers, 1879; B. N. *J.*, xxxvii, 610. *Masonry dams for storage reservoirs*, in Inst. of Civil Engineers, *Proceedings*, 1874-5, pt. 2, xl, 300-3. J. BAILEY DENTON, *The Storage of Water*, 8vo., London, 1874; reviewed in DAILY TELEGRAPH *Newspaper*, Aug. 27, 1874: B. *J.*, xxxiv, 52-3. *Storage reservoirs*, in B. N. *J.*, 1869, xvii, 383, 399, 407, 440, 455, and 473; *idem*, 1867, xiv, 823. In B. N. *J.*, 1874, xxvi, 713, it is stated that, taking "a daily consumption at 16 gals. of water per head per day in non-manufacturing towns, and 20 in manufacturing towns; impounding reservoirs should contain 120 days supply in rainy districts, and 200 in others; service reservoirs to contain 3 days supply. The main should carry double the average quantity to be supplied per hour; its diameter will depend on the quantity of water required to be carried in a given time, and the head. Box's formula (*Hydraulics*), for calculating the diameter of a pipe to carry a given number of gallons per minute is $d=(\frac{GL}{H})^{\frac{1}{2}}\div 3$: in which d = diameter of pipe in inches, L = length in yards, H = head of water in feet, and G = gallons per minute".

RANKINE, *Civil Engineering*, 8vo., Edinb., 1864, 3rd edit., 699-707.

At Rome; *Detached Essays*, Aqueduct; and Bath. PISCINA. CASTELLUM.

Band, bend, bendt, or more usually BUND, is applied to an artificial lake, great tank, or reservoir, and by custom is extended to the dyke or wall which forms the dam. CULAM. ERAI or ERAY. TALAO. These structures have often been made works of great architectural magnificence in India, by covering them with flights of steps, and erecting, in the breaks between these flights, temples, and pavilions, or kiosks, interspersed with fountains and statues. Those at Oodeypore (or Udaipur), 1653-80, and 1680-99, each about 1,000 feet long, are given by FERGUSSON, *Picturesque Illustrations*, fol., London, 1848, pl. 12-13; and that at Poonah, in ILLUSTRATED LONDON NEWS, xviii, 172. The Saymbrumbacum tank (called an *Eray* in Timul language), near Madras, formed by damming up between two natural ridges, is about 7 or 8 miles long and 3 in width, for irrigating the rice fields; it will water the lands of 32 villages for eighteen months; the *codi* or sluice for letting off the water in case of an overflow, is shown in BUCHANAN, *Mysore*, 4to., 1807, i, 4; and *Index*. It is described as at Cauerypauk in the Carnatic, said to be 30 ft. high, and the finest in southern India, in FULLERTON, *Dict.* The *chunna ca bowlee* is an immense excavation, at Nadale in Marwar. A dam five miles long to the kalawa or kalaa or tank at one of the places where it had burst, the chasm sides were 70 ft. high; it was improved and enlarged before A.D. 477; FORBES, *Eleven years in Ceylon*, 8vo., London, 1840, i, 378. One three miles long and 60 ft. high at Darezeh; HAMILTON, *Gazetteer*. TANK.

At CONSTANTINOPLE (p. 132) there are four large reservoirs or tanks, besides three small ones; ALLGEMEINE BAUZEITUNG, 1853, pl. 523-8, transl. in CIVIL ENGINEER, *etc., Journal*, xvii, 84; 167. SALZENBERG, *Altchrist. Baudenk.*, fol., Berlin, 1854. BELZONI mentions several ancient Egyptian reservoirs at Arsinoe, now Medinet el Fayoum. NIEBUHR, *Voyage en Arabie*, 4to., Amst., 1776-80, p. 240, mentions a large one on the river Nile, at Saba or Mehrab in Arabia Felix. The cisterns at Alexandria, for keeping the Nile water, numbered over 308, of which 207 were used at the time of the French occupation of Egypt; DESCR. DE L'ÉGYPTE, fol., v, pl. 37. Others at Carthage and still very perfect. Many Asiatic towns have such means of penning up water. A cistern at the source of the river Chapour is given in FLANDIN ET COSTE, *Perse ancienne*, fol., Paris, 1851, i, pl. 46.

At Medina Roqueda in Africa, a *soriha* or reservoir was formed A.D. 908, 500 brazos long and 400 wide, from which was a spacious canal called the sea, and in the midst of its waters was erected a pavilion called the Arus; over 232,000 dinars of gold were spent upon it; CONDE, *Dominion*, etc., 8vo., London, 1854, i, 404-5. *Albuheras* or great reservoirs in the manner of lakes were formed *cir.* 976, for irrigation, in all the provinces of *Spain; idem*, p. 489; in which country there are three of considerable importance; one near Tibi; another built by Francisco Artigas at Arquis near Huesca; and the third at Lorca, which is said to be 1,500 feet high, of stone, and consisting of seven ramps or *caminos* each 12 feet wide; thus the base would be 84 feet thick; was completed 1739, and filled February 1802, but the dyke gave way in the following April. Two at Merida of Roman or Moorish date.

Aguada is the term used for the lake reservoirs in Yucatan; BATISSIER, *Monumens*, 334.

RESIDENCE; see APARTMENT; CHAMBER; CHAMBERS; COTTAGE; HOUSE; LODGING; MANSION; PALACE; ROOM; VILLA; etc. *What constitutes a royal residence;* BUILDING NEWS *Journal*, 1867, xiv, 392. *Houses and residences*; *an appeal, idem*, 1877, xxii, 483-4. PYNE, *Royal Residences*, 3 vols, 4to., London, 1819.

RESIDENTIAL BUILDINGS, in Victoria street, London, described in BUILDING NEWS *Journal*, 1879, xxxvi, 237. FLAT. LODGING HOUSE.

RESILIENCE or spring. The quantity of mechanical work required to produce the proof stress on a given price of material, and is equal to the product of the proof strain, or alteration of figure, into the mean load which acts during the production of that strain; that is to say, in general, very nearly one half of the proof load; RANKINE, *Civil Engin.*, 1864, p. 226.

RESIN. A liquid which flows from certain trees, either naturally or upon an incision being made, and then generally becomes solid. Such is turpentine of the larch and abele: sandarac of the African arbor vitæ: mastic of the pistacia lentiscus: benzoin of the storax benzoe; Damara resin (dammar resin, HOPEA); amber, and copal. ABIES. PINUS. VARNISH. SACC, *Researches on resins*, B. N. *J.*, 1869, xvii, 165. JOHNSTON, *On the Constitution of the Resins*, read at Royal Society, April 11, 1839; CIVIL ENGINEER, *etc., Journal*, ii, 228.

RESINOUS CEMENT. A mastic of a resinous or bituminous nature, which must be softened or fused by heat; such was FITZ LOWITZ MINERAL FUSIBLE CEMENT, mentioned by PASLEY, *Limes, Cements*, etc., 8vo., London, 1838, p. 28, sec. 42. Varley's and Singer's, were other similar cements. DALY, *Revue Générale*, 1840, i, 165. (MASTIC). The Plumber's cement consists of black resin and brickdust, well incorporated by heat. The black cement for bottling is pitch hardened by resin and brickdust.

Resin and beeswax mixed has been stated to have been used for the fine mortar joints for carved brick work; BUILDING NEWS *Journal*, 1879, xxxvi, 430.

RESISTANCE. That power which, acting in opposition to another, tends to destroy or diminish its effect. There are several sorts of resistance, arising from the various natures and properties of the resisting bodies; as the resistance of solids, fluids, air, etc. A synopsis of the most important results that have been drawn by different writers, is given in GWILT, *Encycl.*, 1876, p. 1306. The resistance of *beams* of soft wood may be considerably increased by strengthening the centre of gravity; as explained in GWILT, p. 599. Of *timbers* to crushing, tearing, tension, splitting, etc. Of *mortars* to cohesion, crushing, and sliding; *idem*, p. 536. Of *metals* to fracture, tension, crushing, or tearing, compression, shearing, etc. ADHESION. COHESION. COMPRESSION. CRUSHING WEIGHT. DYNAMICS and Hydrodynamics. ELASTICITY. FORCE. FRACTURE. INERTIA. IRON (p. 47). METALS. MOVEMENT. ROAD. STRENGTH OF MATERIALS. TENACITY. VIS VIVA. 2.

The elastic strength, or the greatest stress which the material is capable of sustaining within the elastic limits, is of much greater importance than the ultimate or breaking strength. For

in practice, it is necessary, in order to insure the permanency of a structure, that its proportions should be such that, under the maximum stress to which any piece is to be subjected, it should not be strained beyond the elastic limits of its strength; D. K. Clark, in Building News *Journal*, 1877, xxxiii, 448.

Haupt, *Resistance of Posts to flexure*, C. E., 1849, xii, 302. Neville, *Resistance required to sustain banks of earth*, etc., 1845, viii, 242. *Theories of Resistance*, B. N. *J.*, 1877, xxxiii, 404; 448. *Resistance of Beams to flexure*, by Decomble, *Resistance of Materials*, 1872, read by Barnard, at American Society of Civil Engineers, B. N. *J.*, 1874, xxvii, 304. Rankine, *Manual of Applied Mechanics*, 4th edit., 8vo., 1868, and *Manual of Civil Engineering*, 6th edit., 8vo., 1869. Clark, *Manual for Mechanical Engineers*, 8vo., 1877. Daly, *Revue Générale*, Index, p. 180. Wood, *Treatise on the Resistance of Materials*, etc., 8vo.

RESOLUTION OF FORCES. If a body is solicited by two forces which act in the same direction, the resulting force, or resultant, is equal to the sum of both. If two forces act in opposite directions, the resultant is equal to their difference, and the body will move in the direction of the greater. If the lines of direction make an angle with each other, the resultant will be a mean force in an intermediate direction. This is shewn mathematically, by Liebnitz's Theorem. Parkinson, *Elementary Mechanics*, 3rd edit., 8vo., Cambridge, 1863. Minchin, *Statics*, 2nd edit., 8vo., Oxford, 1880. Todhunter, *Analytical Statics*, 3rd edit., 8vo., London, 1866. Chalmers, *Graphical Determination of Forces*, 8vo., 1881.

RESON or reason; see Raising piece.

RESPIRATION. That function in the animal kingdom by means of which the various tissues of the body are exposed to the chemical influences of the gases of the atmosphere, and the products thus formed expelled from the body. It was formerly supposed that some plants took up carbonic acid and gave out oxygen; it was subsequently found that plants, during certain processes gave off carbonic acid and absorbed oxygen gas. In human life, by the action of the lungs expanding and contracting, respiration is effected; from 20 to 25 cubic inches is probably about the quantity of air thrown out from the lungs. The number of respirations in a healthy adult person ranges from 14 to 18 per minute. *Detached Essay*, Ventilation. Kirkes, *Handbook of Physiology*, by Baker, 9th edit., 8vo., London, 1879. Scott, *Principal Facts of the Chemistry and Physiology of Respiration*, 8vo., Edinb., 1870, reviewed in Building News *Journal*, 1870, xviii, 406. 14.

RESPOND, responder, respounder, *i.e.*, corresponding or answering to. (Lat. *respondere*). A parallel corresponding wall; or a demi-pillar attached to a pier at the end of a building; or an arcade corresponding to another. The nave of Eton college chapel "between the responders" was to be 32 feet. Rickman, *Attempt*, 8vo., Oxford, 1848, p. 103. Contract for Fotheringhay church. 16. 17. 19.

RESPONSIBILITY. The authority of an agent is as to its nature;—*Express*, by writing or verbally; or *implied*, from any particular act, the nature of the employment, the custom of the profession, etc. While as to its *extent* it is *general*, to act in a certain character; or *special*, to do a particular act. The implied authority of auctioneers, brokers, solicitors, and others is pretty well defined; but that of architects has not been so clearly established. Accident. Agent. Liability.

Every professional man must possess competent skill and the power of being able to carry out the purpose for which he is employed and paid; for he ought to know how to do that which he undertakes, and it is his fault if he be ignorant of that which he professes; and he must use due diligence and care in the business entrusted to him. He is paid for the exercise of skill and diligence on behalf of his client, which such client does not himself possess, and who has a right to the exercise of such skill as is ordinarily possessed by men of that profession: if from ignorance or carelessness he leads the client into mischief he cannot ask for a recompense, and if his client suffer from his ignorance or negligence he is liable for the pecuniary consequences—the measure of damages recoverable by a principal from his agent, in consequence of a breach of duty by the latter, is the loss or damage to which the principal has been subjected directly by reason of the agent's default or neglect. An agent who undertakes to act for a principal without authority, or who exceeds his authority, is responsible to the other contracting party therefore: thus, an architect who erroneously but honestly believed that he had the authority of his client to order stone for a church he was employed to superintend, was held liable to pay the merchant not only for the stone—but also the whole taxed costs of an action against the client, in which the stone merchant failed, on the ground that the architect's representation was untrue; Randall *v.* Trimen, 18, C.B. 786; 1856.

No agent can take upon himself incompatible duties, and characters, or act in a transaction where he has an adverse interest or employment. If an agent employed on account of his skill is to have in the same transaction an interest opposed to that of his employer, the relation between the parties must lead to disappointment; and this should be borne in mind by those architects who take out quantities for works to be carried out under their own superintendence, in any other capacity than as agent for the client, the quantities being made part of the contract. If the agent makes any profit by any concealed management either in buying or selling or in other transactions on account of his principal, the profits will belong exclusively to the latter; vide *Illicit Commissions* in Westminster Review, July 1877. Thus an architect sharing commission with a surveyor employed by him would be responsible to the client for the gain thus secretly made, and on this the council of the Royal Institute of British Architects, Nov. 1880, published a declaration. Evans, *The Law of Principal and Agent*, 8vo., Lond., 1878. Smith, *A Compendium of Mercantile Law*, 8vo., Lond., 1877. Story, *Commentaries on the Law of Agency*, 8vo., Boston, (U.S.) 1869.

Exceeding the limits of his authority, expressed or implied; the evil results of his negligence or want of skill; are the chief points in which responsibility attaches to an architect. The too-frequent eager desire of the client to secure economy by having work executed with an insufficient quantity or quality of material; the introduction of new materials or methods of construction in the use of which he may not have had experience, demand from him great precautions in proceeding, to avoid being saddled with grave responsibility in the event of failure. The position is frequently complicated by the employment of a clerk of works who may, or may not, be the servant of the architect—by the varying conditions of the relations between architect and client—and by the insidious action of other professional men. The temptation to facilitate the conduct of business by accepting responsibility which would not otherwise attach to him is one to which the architect often yields, but seldom without serious results to himself, which would be avoided by his confining his acts within the limits of his authority as agent; declining to undertake work beyond his knowledge or which he might reasonably anticipate would fail; but devoting due skill and sufficient attention to the work, and maintaining that honourable devotion to the interests of his client, which should be his first characteristic. Wightwick, *Charges and Responsibilities*, Builder *Journal*, 1846, iv, 21, 34, 53. *Resp. in Building*, accident, *idem*, vi, 488. Tattersall, *Rights and responsibilities of Architect and Surveyor*, *idem*, vii, 51. *Architects resp.*, *idem*, 1854, xii, 81 and 105. *Professional resp.*, Building News *Journal*, 1860, vi, 73. T. M. Clarke, *Legal resp. of Architects;* read at twelfth convention of American Inst. of Architects; *idem*, 1878, xxxv, 709; xxxvi, 48: xxxiv, 152, a case in America. T. R. Smith, *Duties of an Architect*, read at Society of Arts, 1869; in The Architect *Journal*, 1869, i, 237, etc. Jenkins and Raymond, *On Building Contracts*, 8vo., London, 1873.

Rights and resp. of Architects and Builders in France, in Builder *Journal*, 1849, vii, 507-8; 518-9. Daly, *Revue générale*, *Passim.*

VITRUVIUS, x, *Præf.*, mentions an ancient law of Ephesus by which every architect who undertook a public work was bound to declare what the cost would be; and the estimate once made, his property passed to the magistracy as security until the works were completed. If the cost and the estimate agreed, honors and recompenses were awarded to him; if the cost only exceeded the estimate by one-fourth, the deficiency was made up from the public funds without his being subject to any penalty: but if they exceeded the fourth part, the excess was charged on his property so held as security. That author expressed a desire that the Romans should have a similar law not only for public but for private buildings, as impunity would not then warrant negligence and ignorance, and only those of recognised ability would practise architecture. Possibly these architects were also contractors. DAREMBERG, and SAGLIO, *Dict. des Antiq. Grecques et Romaines*, 4to., Paris, 1874, i, 374, s. v. Architectus. *Manuel des Lois du Bâtiment*, 8vo., Paris, 1880, i, 53. A rescript of the emperors Gratian, Valentinian, and Theodosius, dated at Constantinople A.D. 385, declared that contractors for public buildings and their heirs should be held responsible for such work during fifteen years, so that any defect or fraud discovered within that period might be made good out of their property. GOTHOFRED, *Corpus Juris*, tit. xii, § 8. *Manuel, etc.*, i, 59. GALLACCINI, *Trattato sopra gli Errori degli Architetti*, 4to. Ven., 1767, c. viii, 18.

In France and those countries which have adopted the Code Napoleon, the general principles of the responsibility of individuals are clearly laid down in the Code Civil, generally in articles 1382-1386; and particularly in succeeding articles from 1787 to 1997. The obligations of the architect as established under the Code may be summarised thus:—the client has the right to demand not only good faith and honesty, but all the care and skill which are necessary to carry out his instructions. The architect is responsible if he fail in watching over the work; if he allow a defective foundation; permit the use of improper or insufficient materials; direct the adoption of defective methods of construction; or neglect to observe the laws and regulations governing buildings, etc.; or the servitudes and agreements of which his client may have made him cognizant. But no consequences result from this responsibility unless the client has been prejudiced, and when the contractor makes good or can make good the injury or defect, the architect is no longer liable. When, however, the architect has directed, and the contractor executed, defective works, each is equally liable. The responsibility of the architect ceases on the same day on which that of the contractor, whose work he has directed, terminates. This limit is by Art. 1792, defined to be ten years; thus. "Si l'édifice construit à prix fait, périt en tout ou en partie par le vice de la construction, même par le vice du sol, les architectes et entrepreneurs en sont responsables pendant dix ans." Under Art. 1794, the client may dismiss the architect he has employed even if the work has been commenced on paying him the profit he would have made if the work had been carried out. For detailed particulars of cases under the Code Civil relating to client, architect, contractor, landlord, tenant, etc., see *Manuel des Lois du Bâtiment*, 8vo., Paris, 1880; *Table générale*, v, 1487-94, s. v. Responsabilité. The entire subject is exhaustively treated in MASSELIN, *Nouvelle Jurisprudence et Traité pratique sur la Responsabilité des Architectes, Ingénieurs, Experts, Arbitres et Entrepreneurs*, 8vo., Paris, 1879, to which and the *Manuel*, the student is referred, as also to PERRIN, *Code des Constructions*, 8vo., Paris, 1872, p. 28-31, s. v. Architecte; 51-69, s. v. Entrepreneur. FREMY-LIGNEVILLE, *Code des Architectes*, 8vo., Paris, 1837, chap. xviii, "de la garantie des ouvrages due par les architectes, entrepreneurs, et ouvriers," p. 286. LE PAGE, *Lois des Bâtimens*, 8vo., Paris, 1838, xi, 2-99, "des vices de construction." A. C.

RESSANT or RESSAUNT (supposed from old Fr. *ressentir*, a return.) A mediæval term for an inflected molding, being single or double (DOUBLE RESSANT), now called OGEE. William of WYRCESTRE, *Itin.*, 1480 (MS. in Library of Corpus Christi College, Cambridge), publ. by NASMITH, 4to., 1778, p. 220, 269. "Ressaunt lorymer" (or larmier) was an ogee with an edge sharply cut forming a drip to conduct water. WILLSON, in *Glossary* to PUGIN, *Specimens, etc.*, 1826. DALLAWAY, *Discourses*, 8vo., London, 1833, p. 174, *Rysant gabbletts* are the ogee gablets of the pinnacles at King's College Chapel, Cambridge; Indenture, 4 Henry VIII. 1. 16. 17. 19.

RESSAUT or RESSAULT. "The effect which a socle, entablature, cornice, or other body has, that either rises or sinks, or stands out of level." 2. 4. 5.

REST. It is generally forgotten that the HOSPITIUM or *hospitale* was originally intended for the relief and entertainment of travellers, particularly of pilgrims; it was therefore generally built at the side of a road, as noticed by TANNER, *Not. Mon.*, fol., Camb., 1787. Amongst such institutions may be mentioned Carman's spital at Flixton in Yorkshire, under the management of an alderman and fourteen brothers and sisters, to preserve travellers from being devoured by wolves and other wild beasts; DUGDALE, *Monast.*, fol., London, 1830, vi, 613. A hall 69 ft. long and 18 ft. wide was built 1202 outside the porte de S. Denis at Paris for belated travellers, according to VIOLLET LE DUC, *Dict.*, s. v. *Hôtel-Dieu*, who, p. 100, indicates that the hôtel-dieu at Paris was originally a traveller's rest. The hospital of S. Thomas à Becket, now called Colle's house, at Beck, in the parish of Billingford in Norfolk, was founded early in the reign of Henry III, to receive thirteen travellers every night. Eastbridge or Kingsbridge hospital dedicated to S. Thomas the Martyr at Canterbury, and the hospital of S. John the Baptist at Warwick, were designed for the entertainment of pilgrims, strangers, and travellers; the hospitals of S. Lawrence founded 1190 for twenty-six persons, etc., outside the gate of the monastery at Reading; of S. Mary at Stroud; and of S. Mary (the maison-Dieu) at Dover, as well as the hospital at Bridgwater in Somersetshire, were to supply the wants of pilgrims, poor travellers, and other indigent persons: in the hospital at Tandridge in Surrey, the care of the sick was added. Sometimes pilgrims or travellers and the sick were alone admitted, as at the hospital of S. John at Oxford. These are mentioned as *rests* rather than as *refuges*, because it does not appear that their benefits were restricted as to time; indeed the sick, the weak, or the weary pilgrim must frequently have required to make a longer stay than of one night. VIOLLET LE DUC bestows particular attention on the hospital built 1293-1303 at Tonnerre (which was evidently a rest rather than an hospital, according to the intentions of its builder, as stated by DORMOIS, *Notes*, Auxerre, 1853), with a hall about 290 ft. long, 61 ft. wide, and 55 ft. high to the boarded collar-beams. DU BREUL, *Antiquitéz de Paris*, new edit., 4to., Paris, 1639, notices, apparently as something extraordinary, the hospital of Ste. Opportune, afterwards of S. Catherine, in the rue S. Denis at Paris, where eleven Augustinian nuns "for the sake of hospitality not cloistered" were bound to harbour poor females for three consecutive days, and provide fifteen large beds; when these beds were full, the later applicants were made to sleep between the two doors (*i.e.*, in the court), that they might neither harm nor be harmed. VIOLLET LE DUC, *Dict.*, s.v. Hôtel-Dieu, and i, 316. HOSPICE. HOSPITIUM. REFUGE. *J. W. P.

RESTAURANT. The name applied in England from the French to a place where hot and cold refreshments with drinks can be obtained, being an establishment superior to an "eating-house." VERITY, *The Modern Restaurant*, The Criterion, read at ROYAL INST. OF BRIT. ARCHTS., *Trans.*, 13 Jan. 1879; BUILDING NEWS *Journal*, 1871, xx, 214; xxiv, 270; plans, etc., 330; xxvi, 709; xxxvi, 60; BUILDER *Journal*, 1879, xxxvii, 72. The Gaiety, B. N. *J.*, 1878, xxxv, 502; 525. S. James's Hall, B. N. *J.*, 1875, xxix, 409. FRANCIS, *Hotels and Restaurants*, Fenchurch Street, B. N. *J.*, 1879, xxxvi, 157; and B. *J.*, xxxvii, 155.

The only example, as a distinct building, of this peculiarly French establishment, which has been found engraved, is in DALY, *Revue Générale*, 1868, xxvi, 177, pl. 43-4, the café-restaurant in place Walhubert, 1860 by G. Davioud. This work illus-

trates the restaurant Chinois at the 1867 Exposition, 1868, xxvi, 271; and those of Russia and Sweden, xxvii, 211, pl. 41-5: also a restaurant in China, 1859, xvi, 103. Another in DALY, *Arch. Privée*, 2nd series, fol., iii, 1872, pl. 11-16, is the café-restaurant, Lyon railway station at Paris, by H. Fèvre.

RESTORATION and RESTITUTION (Fr. *restauration et restitution.*) The latter term was in use before and after the commencement of this century; as in the 1819 catalogue of Royal Academy of Arts; and is still used in DALY, *Revue Gén.* The ECCLESIOLOGIST *Journal*, 1847, vii, 161; which, viii, 83, notices the three systems, the Destructive, the Conservative, and the Eclectic. SOCIETY OF ANTIQUARIES, *Memorandum on Rest.*, 4to., 1 May 1855; and ROY. INST. OF BRIT. ARCHITECTS, *Sessional Papers*, 1856-57, p. 95. MILNER, *Diss. on the Modern Style of Altering Ancient Cathedrals, as exemplified in the Cath. of Salisbury*, 4to., 1798. FREEMAN, *Principles of Church Restoration*, 8vo., London, 1846; with *Preservation and Restoration of Ancient Monuments*, 8vo., Oxford, 1852; C. E. *J.*, 1851, xiv, 421-3. SCOTT, *A Plea for the Faithful Restoration of our Ancient Churches*, 8vo., London, 1850; and *Conservation of Ancient Architectural Monuments and Remains*, read at R.I.B.A., 6 Jan. 1862. VIOLLET LE DUC, *Restauration* in *Dict. Rais. de l'Arch. Franç.*, transl. by WETHERED, with a notice of his works in connection with the historical monuments of France, 8vo., London, 1875. AUBER, *Instructions, etc., à Poitiers: Restauration des Eglises*, 8vo, Paris, 1851. *Entretien des Cathédrales de France et notamment de N. D. de Paris*, in DALY, *Revue Générale*, 1851, ix, 3, 8, 113, 209. BORDEAUX, *Principes d'Archéologie pratique appliqués à l'entretien, la decoration, et l'ameublement artistique des Eglises*, 8vo., Caen, 1852. BURNELL, *Eccles. Monuments of France*, at Royal Inst. of Brit. Archts., 1866. WEALE, *Rest. des Monts. publ. en Belgique*, 8vo., Brux., 1862. BORDEAUX, *Traité de la réparation des Eglises*, 8vo., Evreux, 1862. RADFORD, *What Style in additions to old work*, 8vo., Exeter, 1871. SCOTT, *Lectures*, 8vo., London, 1879, i, 363-4. 14.

Principles of Church Rest., in CIVIL ENGINEER, ETC., *Journal*, 1846, ix, 143; and STREET, *Rest. of Ancient Buildings*, 1861, xxiv, 199. LOFTIE, *Thorough Rest.*; and SCOTT, *Thorough Anti-rest.*, in MACMILLAN'S MAGAZINE, for June and July 1877. *Return* to the House of Commons of the number of churches, etc., built or restored in England since 1840, at a cost exceeding £500; BUILDING NEWS *Journal*, 1876, xxx, 564.

BUILDER *Journal*, 1861, xix, 389, STREET, *On the Rest. of Ancient Buildings:* 422, 440, Ecclesiological Society, *Destructive Character of Modern French Restorations;* and 1865, xxiii, 432, *Restoration generally:* 432, 882, Churches at Rome (S. Prassede). 1868, xxvi, 378, 414, 454, *A Question in Restor.* 1870, xxviii, 202, *Moderation in Rest.:* 649, *The Theory of Rest.* 1873, xxxi, 672, SHARPE, *On Rest.:* 741, *On Rest.:* 1877, xxxv, 550, 552, 572, 592, 601, 617, STEVENSON, *On Architectural Rest.*, and discussion thereon, read at R.I.B.A., May 28: 651, *Rest., Reparation, and Adaptation:* 983, AITCHISON, *What Principles should govern their Rest., or their Preservation as Memorials.* 1878, xxxvi, *Lectures* by E. Barry: and 1219, 1262, *Repair of Churches*, legal. 1879, xxxvii, 201, BENTINCK, *Principles of Rest.:* 881, *Common-sense view of Arch. Rest.:* 1137, CAINE, *A new Phase of the Question of Arch. Rest.:* see Index to volume for restoration of buildings.

BUILDING NEWS *Journal*, 1865, xii, 425, 451, *Rest., Reparation, Adaptation:* 1868, xv, 73, FERGUSSON, *On Principles of Rest.*, in FORTNIGHTLY REVIEW, Jan. 1868: 1875, xxix, 359, GUILLAUME, *Rest., What does it mean?:* 386, 413, VIOLLET LE DUC, *On Restoration*, review: 1876, xxx, 487, 535, *Gothic Rest. in France:* 1877, xxxiii, 216, C.B.A., *Antique Art; its Restor.:* 323, *Thorough Rest.:* 582, *Rest. of Italian Monuments:* 1878, xxxiv, 174, BARRY, *Modern Architects and Rest.:* xxxv, 207, *Rebuilding and Renovation.*

Society for the Protection of Ancient Buildings; *Statement*, B. *J.*, 1877, xxxv, 866, 915. Second annual meeting, 1879, xxxvii, 750.

Among the most remarkable instances of restorations, are the statue of Mausolus, now in the British Museum, out of sixty-five fragments; and the shrine of S. Alban, of which about two thousand fragments were found 1872 built into a wall, and were put together by the clerk of the works. *Statue;* in ATHENÆUM, 1854, No. 1373, p. 219; and those at the Vatican, in *Handbook to Rome.* The tomb of Geof. Chaucer in Westminster abbey was "reedified in my memory by Mr. Brigham", *i.e.*, before 1570-7; LAMBARDE, *Dict. Angl. Topog., etc.*, 1730, p. 390. Of edifices, should be mentioned; king Henry VII's chapel, at Westminster, 1809-22 by T. Gayfere under J. Wyatt, R.A.; and of the banqueting house or Whitehall chapel, 1829-30 under Sir J. Soane, R.A. 6.

RESTORING a wall to the perpendicular; see PERPENDICULAR. PRESSURE.

RESTWOMYLL, restwemyll, 1465; restwymbyll, 1446. A term supposed to mean a WOMBLE with a *rest* to it, being then similar in principle to the stock, brace, drill, or crank, of the present day. SURTEES SOCIETY, *Finchale Priory*, 8vo., London, 1837, p. 444.

RESURRECTION GATE, also called LICH GATE. A term given to a gateway having a carving of the resurrection. One existed at S. Giles' Cripplegate, London, until 1865; another, belonging to S. Andrew's, Holborn, was at that time over a fireplace in Bangor house, Shoe Lane; that at S. Giles'-in-the-Fields was set up 1687; it is of oak; when taken down 1865 it was moulded, and a cast preserved in the South Kensington Museum; it was replaced over the gateway in its altered position: another in the vestibule of the church of S. Mary at Hull, was formerly over the gateway leading to the churchyard; BUILDER *Journal*, 1880, xxxviii, 311; GUENEBAULT, *Dict. Icon.*, ii, p. 300.

RETABLE. This Fr. term for ALTAR PIECE or REREDOS (Span. *retablo;* Ger. *altarblatt*); and CONTRE-RETABLE (Span. *trasparante;* Ger. *rückenblatt des altarstückes*), appear to have been used as synonyms by some of the best foreign archæologists. Account of the church at Faverolles given by ESCALOPIER, in SOCIÉTÉ ROYALE DES ANTIQUAIRES DE LA FRANCE, *Mémoires*, 8vo., Paris, 1840, new series, v, 375, who agrees with the DICT. DE L'ACADÉMIE in defining *retable* as the *whole* of the reredos of an altar, and *contre-retable* as the panel of sculpture or painting *in* that reredos, not in the *front* (FRONTAL) of the altar, which *front* is the *retable* according to many writers. MILLIN, *Dict. des Beaux Arts.* The *retable* at Coblentz, given in VIOLLET LE DUC, *Dict. du Mobilier;* and in CHURCH BUILDER *Journal*, 1876, p. 221, is the *contre-retable* as above explained. Retables were as old as XI cent., GENTLEMAN'S MAGAZINE, 1861, p. 550. GUENEBAULT, *Dict. Icon.*, 8vo., Paris, 1845, seems to have mixed the examples which he gives, viz., the pala d'oro of S. Marco, Venice; of S. Ambrogio at Milan; and of Sta. Maria Novella at Florence (FRONTAL); of XVI cent. in chapel of the château de Pagny (Côte d'Or) by BAUDOT, fol., Dijon, 1842; of XV cent. in chapel of S. Laict in Reims cathedral, PARIS, *Toiles peintes, etc.*, fol., Reims, 1843; XVI cent., church of the convent of the Célestins at Paris; old chapel of the convent of the Cordeliers at Troyes, ARNAUD, *Voyages*, 4to., pl. 105-6; 1306 in cathedral at Cologne; XV cent. at Brou, *Moyen Age Mont.*, pl. 52; at Sens; and renaissance, S. Ulric and S. Afra at Augsburg, HERTFELDER, *Hist. Basil.*, fol., 1712; several of XIV and XV cent. in DU SOMMERARD, *Les Arts au Moyen Age*, fol., Paris, 1838-46, Atlas, c. 5, pl. iv; c. 12, pl. 1 and 3. SCOTT, *Gleanings from Westminster Abbey*, 8vo., London, 1863, p. 105, pl. 20-23, by W. Burges.

The *retablo* of the Spanish churches is a huge erection of carving, gilding, and painting on wood or stone arising immediately behind the high altar, generally to the roof, and finished with the rood, taking the place of the east window. In 1440 the *retablo* in the cathedral at Oviedo was considered one of the best in Spain. J. M. de Aldehüela erected one of jasper and stucco in the church of the Augustines at Malaga. Others XV cent., Barcelona cathedral, *Moyen Age Mont.*, pl. 179, and *Espagne Artistique et Monumentale;* at Valencia, etc. 66.

WEALE, *Handbook to Belgium, etc.*, 8vo., London, 1859, mentions among many rereboses (or retables) of oak and stone; the

stone reredos in the church of S. Dympna at Gheel as of end of XIII cent.; many of XV and XVI cents. in the form of a triptych; with the fine one in S. Peter's at Cologne, *cir.* 1465, which has the wings still remaining. Some examples are given in KING and HILL, *Mediæval Arch. and Art*, 4to., London, 1858-68. At Soest in ECCLESIOLOGIST *Journal*, 1855, xiii, 372, with sketch; in S. James' church, Rothenburg, XV cent., BUILDER *Journal*, 1879, xxxvii, 72. The *retables* in the cathedral at Bâle, at S. Germer, in Nôtre Dame at Hal, and in church at Braine le Comte, are given in GAILHABAUD, *L'Arch. du Vme.*, fol., Paris, 1850. In the church at Caumont, NODIER, *Picardie*, fol., Paris, 1835-48, iii, s.v. Montreuil. Retables of ancient altars in DALY, *Revue Générale*, ii, 79; of the chapel at S. Germer, x, 369 and xi, 435. Some examples are to be seen in the South Kensington Museum.

RETABLE is used now in England for the shelf, temporary or otherwise, above the altar and between it and the east wall. A series of such shelves is convenient for sustaining vases of flowers and candlesticks.

RETAINING WALL, and REVETMENT. A wall formed of timber, stone, brick, or concrete, for the support and maintenance of a body of earth, when circumstances, as where the land is valuable, render it inexpedient to slope the same gradually down. Such a wall is battered on the outside face from 1 to 1½ ins. to the foot; the greatest degree of batter (which is often curved), being given to the foot of the wall. Counterforts are invariably carried up at the back of a retaining wall; piers are also sometimes placed on the face, which break the monotony and hide any settlements which may subsequently occur. The back of the wall should be well drained, more especially if the lay of the ground causes the water to collect there. The soil when filled in against the wall, requires great care, or a failure eventually occurs, as specially noticed by HARTLEY, at INST. OF CIVIL ENGINEERS, 1841. Iron land ties are of considerable service if of ample length. One of the best examples of a cutting with a curved retaining wall (though it failed) is that on the North Western railway (London and Birmingham), between Euston Square and Camden Town, as explained with other systems by HOSKING, at INST. OF CIVIL ENGINEERS, 1845. Brick piers with segmental arches between, backed by concrete, to the Metropolitan railway, B. N. *J.*, 1861. The failure of the pier at Greenwich is noted in CIVIL ENGINEER, *etc., Journal*, 1843, vi, 253; and BUILDER *Journal*, i, 187. BATTER. EMBANKMENT.

A retaining wall without a surcharge has the earth level with the top of the wall; in a surcharged retaining wall the earth rises from the summit as a slope. The Fr. *cannonière* is the hole in the wall formed for draining the water from behind it.

PRONY, *Poussée des Terres.* BRUNTON, *Excavating Ground and forming Embankments*, 8vo., 1836. BREES, *Railway Practice*, four series, 4to., 1837-47. HANN AND HOSKING, *Practice, etc., of Bridges*, 8vo., 1843; Suppl. 1853. TATE, *Mechanics*, 12mo., 1847, p. 114. HASKOLL, *Railway Guide*, 8vo., 1848, pt. 2, p. 130. MURRAY, *Treatise on the Stability of Ret. Walls*, 8vo., 1855, and CIVIL ENGINEER, *etc., Journal*, xviii, 398. RANKINE, *Manual of Civil Engineering*, 8vo., 1864, p. 401, 409. JACOB, *Practical Designing of Ret. Walls*, 8vo., 1867. SPON, *Arch. and Builders Pocket Book* for 1881.

INSTITUTION OF CIVIL ENGINEERS, *Proceedings;* 1841, HARTLEY, *On Embankments, etc.*, i, 143: 1844, GREGORY, *Railway Cuttings and Embankments*, iii, 135-171: HOSKING, *Constructions to retain sides to deep Cuttings*, 353-73: HUGHES, *Draining Banks; and Ret. Walls*, 1845, iv, 81-6: RENNIE, in 1846, v, 41: and BAKER, *Lateral Pressure of Earthwork*, 1881, lxv, 140, with cuts. CORPS OF ROYAL ENGINEERS, *Papers*, 1845, vii, 69, gives *On the Pressure of Earth against Revetments, and the best Form of Ret. Walls;* p. 137-59, *Railway Earthworks, Embankments, etc.*, pl. 34-5; and p. 160, DEMPSEY, *Descr. of the Mode adopted for Repairing, etc., the Retaining Wall of the L. and B. Extension Railway;* 2nd series, 1849-50, i, 68 and 402; and new series, ix, 64, *Failure at Fort Elson;* xi, 144, *Vaulted Revetments;* and xv, 161, *Concrete Revetments.*

CIVIL ENGINEER, *etc., Journal*, 1841, iv, 395, HARTLEY, *Retaining Walls* should have the ground gradually filled in to prevent a strain on them: 1845, viii, 379, DEMPSEY, *Railway Retaining Walls:* and 209, HOSKING, *Constructions to Side Cuttings*, with examples: 1846, ix, 109 and 135, *Pressure on Ret. Walls:* and RENNIE, 1847, x, 55. BUILDING NEWS *Journal*, 1862, viii, 250, RUTT, at Inst. of Civil and Mech. Engineers: 1867, xiv, 285, *On Ret. Walls:* 1873, xxiv, 329, CONSTABLE (of New York), *An Attempt to Reconcile Theory with Experiment;* and xxvii, 281: xxv, 421, 465, 478, (498), JACOB, *Practical Designing of Ret. Walls:* 1874, xxvii, 329, Prony's formula: 1877, xxxii, 164, *Ret. Walls; How to Construct them:* 1878, xxxiv, 561, *Best Form of a Ret. Wall:* 1878, xxxv, 529, *Ret. Walls for Water or Semi-Fluid Earth:* 1879, xxxvii, 117, *Mechanics of Ret. Walls.*

RETHEN (HERMANN VON), *baumeister*, flourished *cir.* 1360, is one of only two names found recorded by MILDE and DEECKE, *Denkmäler—Lubeck*, 4to., Lubeck, 1843-7.

RETICULATED TRACERY; see NET TRACERY. A large class of windows contains tracery formed by the repetition of the same foliated opening, usually an ogee quatrefoil, but occasionally a trefoil. The whole of the windows of the Lady chapel at Wells cathedral are an example; while the largest perhaps is the seven-light east window of Milton abbey church; SHARPE, *Decorated Window Tracery*, 8vo., London, 1849, p. 107. FREEMAN, *History*, passim, window tracery. BUILDING NEWS *Journal*, 1870, xviii, 69 and plate; which 1857, iii, 371, notices that in each bay of the second south aile at S. Mary Magdalene church, Oxford, is a three-light window with rich reticulated tracery, so similar to others in S. Aldate's and S. Michael's (especially the former) that it seems highly probable that the same architect designed them all; early XIV cent. work. Many rich examples of reticulated work are given in BOURGOIN, *Les Arts Arabes*, fol., Paris, 1868. Also of Indian perforated work in the queen's mosque at Mirzapoor, *cir.* 1431, in HOPE and FERGUSSON, *Arch. at Ahmedabad*, 4to., London, 1866, pl. 31-8; and in TAYLOR and FERGUSSON, *Dharwar and Mysore*, fol., London, 1866. The publications on Egyptian architecture illustrate numerous examples. TRELLISE.

RETICULATION. Net masonry: see RETICULATUM.

RETICULATUM OPUS. A variety of the Gr. *emplecton.* Roman masonry having a face formed of small square stones or tufa, being plain on the face and wedge shaped at back; the blocks were placed upon one angle, and so presented a lozenge appearance. VITRUVIUS, ii, 3 and 8. PLINY, *N. H.*, xxxvi, 51. This system had great want of durability in consequence of the tendency which such walls have to settle into cracks, it having no bonding, being only a casing or outside facing to rubble work, and intended apparently to receive the intonaco or plastering, as it was not used for outside work. Any bond is given by lacing courses of ordinary tiles (*mattoni*) or stone, which were also used for the piers or quoins. Probably this work was built up against waling boards and the concrete and rubble filled in against it. "The earliest *dated* examples are believed to be of the time of Sylla; in these the mortar in the joints is much thicker than in the best work of this kind, which is about a century later; it is not found in Rome after the time of Hadrian (117-138), and is usually considered as a mark of 1st century of the empire and of the Christian era"; One of the best examples in Rome is the important house excavated 1869-70 on the Palatine, the domus Augustiana et Tiberiana; PARKER, *Walls of Rome*, 8vo., Oxford, 1874, ch. iii, 17, 54; pl. 7 and 8. Good examples are also seen in the side of a wall in the curia in the forum; and in a tomb in the Street of Tombs, near the gate of Herculaneum, both at Pompeii. Beyond the tower of the 'pignattara' on the road to Præneste from Rome, are a great number of little ruins, mostly of rubble, with a facing of reticulated work in tufo, of the sort which VITRUVIUS describes as calculated to last eighty years; WOODS, *Letters.* Similar work is seen over the western semicircular door at Le Mans cathedral; and at Cologne in the brick *Klarenthurm:* also in cut flint in many churches in Norfolk

and Suffolk. CEMENTITIA STRUCTURA. DIAMICTON. EMPLECTON. 1. 17.

RETREAT. "In masonry, a little recess or diminution of the thickness of a wall, etc., in proportion as it is raised." 4.

RETREAT. A covered seat, an alcove, an arbour, or a temple, placed in a garden or ornamental grounds for refuge in case of rain, or as a resting place.

RETROCHOIR. That portion of a large church immediately behind the reredos, and in which was usually placed the shrine of the patron Saint; at that of Hugh at Cluny; of Louis at S. Denis; at Winchester, S. Alban's, Bury, Durham, Bridlington, Lincoln, Lichfield, Westminster, and Canterbury. It is sometimes called the LADY CHAPEL. Other large examples of a retrochoir exist at Peterborough cathedral, 1438, 1496-1528, having fan groining: the chapel of the nine altars at Durham cathedral, 1228-41; at S. Mary Overy church, Southwark; and formerly at Fountain's abbey, Yorkshire.

A very natural and almost obvious name for what is beyond the eastern screen of the choir including the presbytery (p. 274); but probably monastic writers meant by retrochoir the part north and south behind the stalls, *i.e.*, the choir ailes (p. 274-8). WEBB, *Cont. Eccles.*, 1848, considers it as "an aile or area providing a free passage round, and behind, a choir and altar". It has been used by STREET for the portion behind the great screen otherwise called Holy of Holies, and the portion between this and the Lady chapel he calls presbytery (p. 281), as at Winchester; but BOUTELL appropriates them differently. Also a separation between the choir and sacrarium (presbytery of Sarum rite, sanctuary, or sacrarium); ECCLESIOLOGIST *Journal*, 1849, ix, 273-80, *The Retrochorus of Conventual Churches*, which shows that it was the established name in some conventual churches for a place assigned to a special purpose, viz., the reception of certain of the sick and infirm. In the church of S. John of Jerusalem, Great Ormond Street, London, the sisters are placed in the retrochoir; this custom prevails also on the continent, for their greater privacy.

RETTI (JOHANN), with Frisoni, commenced the magnificent palace, one of the largest in Germany, at Ludwigsburg, four miles from Stuttgard, begun 1730 for duke Eberhard Louis of Würtemberg. They were succeeded 1752 by L. P. de la GUÊPIERE, as stated s. v., who completed it and published a description, fol., Stutt., 1750. It is now 1879 neglected. Retti also restored the schloss Cadolzburg. 28. 68.

RETURN. A side or part that falls away from the foreside of any straight work. The continuation of a projection, moulding, etc., in a different or opposite direction. QUIRK. The termination of the dripstone or hoodmould of a window or door; DRIPSTONE; KNEE.

RETURN BEAD. The same as a bead and double quirk at the angle of stuff. BEAD, fig D. STAFF BEAD.

REUS. A town near Tarragona in Spain. In the portion dating 1151 is the principal square around which are colonnades for shops. The parish church, dedicated to S. Pedro, is of simple Gothic; it was much enlarged 1510 by B. Oger, as stated in LLAGUNO, i, 290, who gives the agreement; and in 1545-62, when a chapel, the lofty hexagonal tower completed 1566 on the right hand of the nave, and three chapels on the left hand were added by D. Sarona. A Franciscan monastery, one of the finest in the province, is now occupied as a college. The town house (Tuscan) has fine halls of sculpture and painting. An extensive modern prison; asylums; hospital in the Carmelite monastery; barracks for two full battalions of infantry and two squadrons of cavalry; and a theatre for 1500 persons, are other buildings of note. The modern town dating from 1750 is due to the English. Many of the public buildings were burnt 1869-74. LOCKER, *Views in Spain*, 4to., 1824, pl. 2. 28. 50.

REVAL or REVEL (Russ. Kolywan; Est. Tatlin). The capital of the government of Reval or Esthonia, in the gulf of Finland in Russia. The *dom* church has some old tombs dating from 1585. The cathedral of S. Olaus rebuilt 1840 has a tower 429 ft. high on the same scale as the old one, and an old library of 10,000 volumes; S. Nicholas church dates 1317; the *heiligengeist-kirche, cir.* 1219; Roman Catholic church; and four Russo-Greek churches of which S. Nicholas, by L. Rusca, is given in his *Recueil*, fol., S. Pet., 1810, pt. H, pl. 33. The castle near the governor's residence; the *ritterhaus* or house of assembly of the nobles; the renovated *rathhaus*, of which the spire is considered a masterpiece; and several guildhalls with groined roofs, particularly the chief one, the *schwarzen häupter*, founded 1343 for the defence of the city, are among the buildings of interest. STEIN, *Lexicon.* HÖRSCHELMANN, 1833. CANNABICH, *Taschenbibliothek*, 1835. 14. 28. 50.

REVEAL or REVEL. The vertical return or side of an aperture, as of a window and a door. It is generally set square with the face, and usually 4½ ins. deep when brick is used. The inside return is termed a *jamb*, which is sometimes splayed. The return inwards from the reveal is a REBATE (Fr. *feuillure*). The reveal of a chimney is usually about 14 ins. deep or more, or 18 ins. or more to a kitchen fireplace. The Statute 7 Anne, enacted that in London after 1 June 1709, "no door frame or window frame of wood to be fixed in any house or building within the cities of London, etc., shall be set nearer to the outside face of the wall than 4 ins." Previously to this, as was also the case in the country, reveals had only about 2 ins.; or the window frame was even flush with the outside face of the wall. 1.

Windows in Assyrian sculpture are represented square headed, generally, and have the peculiarity of a double or rebated external reveal, by which means, like the "splay" in Gothic architecture, additional light was gained, the actual apertures being very narrow. *S. S.

REVELEY (WILLEY), was 1781-2, a pupil of Sir W. Chambers. His journal through Italy, Greece, Egypt, etc., as "architect and draftsman to right hon. Sir Richard Worsley, bart.", is in the library of the Royal Inst. of Brit. Archts. He left England 1784; and Rome 12 Feb. 1785; was at Athens 10 May, at Rhodes 21 July, Paris 1788, and London 1789. He designed 1791-8 All Saints church at Southampton (LACUNARIUM); made designs for public baths at Bath, and an infirmary at Canterbury (not executed); 1793 lodges at Stourhead, Wiltshire; submitted plans for wet docks on the Thames to Parliament; and designed 1798 Windmill hill, Sussex, for W. H. Pigou, esq.; given in RICHARDSON, *Vit. Britt.*, fol., London, 1802-8, i, pl. 26-7. He edited the third volume of STUART and REVETT, *Antiq. of Athens*, fol., London, 1794, in the preface to which he replied to the attacks by Sir W. Chambers on Greek architecture; these remarks are quoted by GWILT in his edition of that work, 8vo., 1825, i, 114-6. A folio volume of *Tracings and Drawings of Ornaments*, and the *Sale Catalogue of Drawings, Designs, Books, etc.*, 1801, are in Sir John Soane's museum. Drawings by him from actual measurement of the pyramids were 1814 hung on the staircase from the lower to the upper library at New College, Oxford; ACKERMANN, *University, etc.*, 4to., London, 1814, i, 171. He died 6 July 1799: GENTLEMAN'S MAGAZINE, lxix, pt. 2, p. 626. 3.

Henry Willey Reveley, architect and civil engineer, was 1822-3 a member of the committee for Subways in the metropolis; WILLIAMS, *Subways*, 8vo., London, 1822, p. 72-135; and 1821 sent a communication to the Society of Arts on *Tuscan Mill Stones*, as given in *Transactions*, 1823, xl, 47.

REVERA RIDA (G. DE); see RIBERO RADA (J. DE). 66.

RÉVEREND (.....), architect to duke Charles IV of Lorraine, constructed 1701 the convent and church of the religieux tiercelins at Nancy, where he made 1703 the *toisé* of a work of pavement executed upon the place Notre Dame, and to the roadway leading to the arsenal. In 1717 he was with Guesnon charged with the reconstruction of the château de la cour, adjoining to the ducal palace. LEPAGE, *Arch. de Nancy.* LANCE, *Dict. Biog.*, 1872.

REVELL (J.....). Besides the notice s. v. RAVILE, he 1561-2 gave as his new year's gift to queen Elizabeth, "a marchpane with the modell of Powle's churches and steeples in past"; the queen returned him "Oone haunce pott guilt, per oz., 11¼ oz.";

NICHOLLS, *Progresses*, 4to., London, 1823, i, 118; 127. ELIZABETHAN ARCHITECTURE.

REVERBERATION; see ECHO. VITRUVIUS, v. 3.

REVERSION. By this term is meant a right of property, the enjoyment of which is to commence at a future period, fixed or depending on contingencies, and is to continue either for ever or during a term either fixed or depending on a contingency. *Tables* in *Treatise on Annuities* in LIBRARY OF USEFUL KNOWLEDGE. *Companion to the Almanack* for 1840. SPON, *Arch. and Builders' Pocket Book* for 1881. Church Estates Commissioners, eighth general Report, 1859: reviewed in BUILDING NEWS *Journal*, v. 847. 14.

REVESI BRUTI (OTTAVIO), a nobleman of Vicenza, designed a number of buildings at Brendola, the family estate, and published *Architesto per formar con facilità li cinque ordini di architettura*, etc., fol., Vic., 1627, with an instrument being a species of proportional compasses; transl. by MALIE, *A new, etc., method of delineating*, fol., London, 1737; 1767. 3.

REVESTRY. The old orthography, and the general term, for the place now called a VESTRY. "The monks were always revest in the same place"; SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, p. 351. SACRISTY.

REVETMENT (Fr. *revêtement*, or clothing.) The lining which clothes the steep sides of a rampart, and sustains on its interior side the pressure of the earth behind it. RETAINING WALL. SHEETING.

REVETT (NICHOLAS), printed RIVETT in the earlier pages of WOODS, *Antiquities of Athens*, 1816, was born "about 1721" at Brandeston hall, near Framlingham, Suffolk, the seat of his father, John Revett. He left England for Rome 22 Sept. 1742, and studied painting under cav. Benefiale, where, becoming acquainted with James Stuart, he 1750-4 proposed and accompanied him and W. Pars to Athens, subsequently preparing the drawings for publication as the *Antiq. of Athens*, fol. 1762, 1787, and 1794. In 1764 he visited Greece for the Society of Dilettanti, his drawings being published in *Antiquities of Ionia*, fol., London, 1769 and 1797: these drawings are now in the print room of the British Museum. He designed *cir.* 1768 the large projecting portico on the east front and some internal decorations, at Standlinch, Wiltshire, for James Dawkins, esq.; WOOLFE AND GANDON, *Vitr. Britt.*, fol., London, 1771, ii, pl. 81-4; the house by J. Wood: 1778-9 the church at Ayot S. Laurence, Hertfordshire, for Sir Lyonel Lyde, bart.; a sketch of the church with a tomb and inscription in memory of Revett, is preserved in the illustrated edition of CHAUNCY, *Herts.*, fol., 1700, by Baskerville, in the British Museum: and about 1791 the east and west porticoes for lord Le Despencer at High Wycombe, Buckinghamshire; also the temple to Flora, with a second one, and a third on the island. He died 3 (not 1) June 1804, aged 84, and was buried near the family vault in Brandeston churchyard. His library was sold 26 June 1804; a copy of the catalogue is in Sir John Soane's museum. His copies of CHANDLER, *Travels in Asia Minor*, 4to., Oxford, 1775; and *Travels in Greece*, 4to., 1776, with Revett's MS. notes, were bought by Geo. Saunders, who presented them to the British Museum; they were republished with the notes, 8vo., Oxford, 1825. GENTLEMAN'S MAGAZINE, 1804, lxxiv, pt. 2, 690; 860; 1821, xci, pt. 2, 423; xlix, 374; 1788, lviii, pt. 1, 217; lix, 972. WOODS, *Antiq. of Athens, etc.*, fol., London, 1816, iv, introd. xxi. BUILDER *Journal*, 1848, p. 415; 1862, xx, 644. 68.

REVIVAL. The term often used to correspond with the Fr. *Renaissance*, as applied to the introduction of the details of Italian art in England. ELIZABETHAN ARCHITECTURE. The "revival or resuscitated style" is a term used by SCOTT, *Lectures*, 8vo., London, 1878-9, ii, 313; and 317-321 refers to the "Gothic revival" and "the development of a new and vigorous style upon the foundation of the glorious architecture of our own country and of our own forefathers, in the place of one at once alien to our race and our religion." RENAISSANCE ARCHITECTURE.

The abbot Gundelande, founder of the first abbey at Lorsch, built it, not in the modern style, but according to that one "more antiquorum et imitatione veterum"; STRUVIUM, *Script. Rer. Germ., Chron. Laurishamense*, i, 82. MOLLER, *Denkmäler*, fol., Darm., 1821, 4 pl., p. 27. "Nothing in the entire history of architecture is more remarkable than the spirit of Renaissance with which the mediæval architects of the south of France appear, at one time, to have been inspired. This rage of imitation (of the Roman style) appears to have reached its height towards the middle and close of XII cent.;" SHARPE, referring to the cathedral at Avignon; BUILDER *Journal*, 1861, xix, 254.

PETIT, *The Revival of Styles*, BUILDER *Journal*, 1861, xix, 350; 369; CIVIL ENGINEER, ETC., *Journal*, xxiv, 195; 227. EASTLAKE, *The Gothic Revival*, 4to., London, 1872; and reviews. PARKER, *Art Revival of the XI Century*, B. J., 1876, xxxiv, 431. SEDDING, *Revival of the Later Styles of English Gothic, idem*, 1878, xxxvi, 17; and BUILDING NEWS *Journal*, xxxiii, 680. BONNAR, *Notes on the Present Art Revival*, B. J., 1879, xxxvii, 574; 606. BREWER, *Revival of Eccles. Arch. in Germany and Holland*, read at ROY. INST. OF BRIT. ARCHITECTS, *Sessional Papers*, 1870-71; and BUILDING NEWS *Journal*, xxi, 386. *Queen Anne Style*, B. N. J., 1875, xxviii, index; 1876, xxxi, 171; and *Late Gothic; shall it be revived?*, 1877, xxxiii, 609. BROWNING, *Art Revival in Italy, idem*, 1874, xxvi, 583, noticing nine principal schools of painting.

REVOLVING. A term prefixed to certain things to show that they are capable of being turned over, round, or wound up, as grates, shutters, chimney cowls, ventilating guards, etc.

REWARD and PUNISHMENT. Among the instances which have been noted are: João Potassi, who designed 1500 the church at Belem in Portugal. The vaulting of the nave having failed, it was rebuilt by him, and before the scaffolding was removed he fled to France; on hearing of the stability of the new work, he returned, was rewarded with a pension, and had his bust carved on the first column on the gospel side. Mi'mar Bashi or head builder, had his hands cut off; EVLIYA, *Travels*, 4to., London, 1834, i, 68; who also notices in a long account that Christodoulos (called Cristobolo by MILIZIA), who lived 1469 at Constantinople, was rewarded by a street inhabited by Christians. The mosque of the Fishery or the new Djaima Djedid, at Algiers, was designed (1675-6) by a Christian architect of Greek extraction, who was bowstrung or burnt; LEWIS, at Roy. Inst. of Brit. Archts., *Sessional Papers*, 1868-69, p. 67. Sir C. Wren had a reward, "ex mero motu" from king Charles II, for his exertions at Chelsea hospital. STREET, *Gothic Arch. in Spain*, 8vo., 1865, notices a few instances. PAVIA.

REY (ANTON DEL) is said 1586 to have directed and built the church and college (Corinthian) of Corpus Christi or del patriarcha, at Valencia. Some of the columns were obtained from Alicant, Carthagena, and perhaps Italy; it has a magnificent staircase. Juan de Herrera was consulted on the works, and Anton is said to have been a disciple of that master. 3. 66.

REY (GUILLEN DEL), his brother; to whom is attributed the cloister 1586 in the cemetery of the Carthusians at Portaceli.

REYERS (ZEGER), born 16 Oct. 1790, at Arnhem where his father was director of public works. He studied under his uncle Husly; 1808 was sent by the king to Paris, where he studied under Percier; visited Italy and Germany, returning in 1813. In 1819 he was appointed town architect at the Hague, where he designed the infantry barracks; the bathing establishment at Scheveningen; the large cemetery and buildings belonging to it; and the academy of fine arts. He was member of the Royal Academy at Amsterdam; 1835 hon. and corr. member of the Roy. Inst. of Brit. Archts.; and 1837 member of the Roy. Inst. of the Netherlands. His death was announced in 1864. 24.

REYKJAVIK. The capital of Iceland. BUILDING NEWS *Journal*, 1874, xxvii, 223.

REYNS (N. D. DE); see DYMENGE DE LEGERI. It has been supposed that Reims was meant.

REYSBROECK (JOHN VAN); see RUYSBROECK (J. VAN.)

REYSECK or REYSEK (MATHIAS), rector of the teinschule at Prag, flourished at Prag 1475-93: With meister Beness or Benesch von Laun he was 1500 (or *cir.* 1515) busy in the con-

tinuation of the Barbarakirche at that city; and also of another of the same name at Kuttenburg. 26. 92.

REZ DE CHAUSSÉE. A French term, often used by English writers, and explained as "the surface of a piece of land on a level with a highway or street"; and with reference to the floor of a building at the level of the street. "Rez de chaussée des caves", or "rez d'un premier étage", are written but improperly. *Au ras du sol* is used in Rouyer et Darcel, *L'Art Arch.*, 4to., Paris, 1863-66, ii, 28. 5. 25.

REZZIATO MARBLE. Perhaps the same as Reggiato.

RHAGES. A large town of Media: the capital of the Parthian empire, and now represented by Rai, Rei, or Rhey. The place to which the Jewish exiles were sent; Tobit, i, 14; iv, 20; ix, 2. It was rebuilt by the Greeks, Strabo, p. 524; again by Seleucus Nicator, who called it Europus; and again rebuilt by one of the house of Arsaces, who called it Arsacia. Ker Porter, *Travels*, 4to., London, 1821-2, i, 358. Keppel, *India*, 8vo., 1827, ii, 133. Vaux, *Nineveh and Persepolis*, 8vo., 1850; 1855. Coste, *Monumens Mod. de Perse*, fol., Paris, 1867, 2 pl. "The peculiar pendant ornamentation of vaults and niches, as in the Alhambra, is identical in style with that used throughout Persia down to the present day; and specimens have been found in the ruins at Rhages, a city finally destroyed 600 years ago", R. M. Smith, *Persian Art*, 8vo., London, 1876, p. 3. 23.

RHAMNUS. A place situated on the eastern coast of Attica, now represented by Ovrio Kastro. The *hieron* contained two temples; 1, a small Doric temple *in antis*, the oldest of the two, and supposed to be dedicated to Themis; it is 31 ft. by 21 ft., and is without an opisthodomos. It was probably damaged by the Romans. The walls are stated to be of opus incertum work; Hittorff describes them as cyclopean (Lesbian walling). The columns have twenty flutes with a slight fillet. Two votive marble chairs were found in the pronaos.

2, A Doric temple to Nemesis, hexastyle peripteral, 71 ft. by 33 ft., having twelve columns on the side, the twenty flutes filleted are only worked at top and bottom of the shaft, those of the pronaos were fluted in front with planes behind. It is supposed that this example is unique as regards the antæ corresponding in position to the columns. It was probably commenced under Pericles (B.C. 444-429); parts were found of a colossal statue supposed of the goddess, which was the work of Pheidias; Strabo, ix, 399. Pausanias, i, 33. Society of Dilettanti, *Unedited Antiq. of Attica*, fol., London, 1817, chap. 6-8; and Hittorff, *French edit.*, 1832. Walpole, *Memoirs*, 4to., London, 1817, p. 307. Woods, *Letters of an Architect*, 4to., 1828. Lacunarium. Mæander. Anta. Imbrex. 2. 6. 23. 25.

RHAMNUS Catharticus, the Buckthorn. An indigenous shrub, having berries, the juice from which is the source of the pigment called sap-green or bladder-green. It is an acrid and almost poisonous article. Some of the species are used in dyeing. The R. Purshianus is much employed near Boston, U.S., for useful and ornamental hedges, bearing well to be cut, growing thick, and remaining green till winter. Nuttall, *North Amer. Sylva*, 8vo., Phil., 1849, ii, 53. 14.

RHEA or Hera. The Greek goddess, the wife of Zeus, and the same as the Roman Juno. heraeum. A good example, 180 ft. by 60 ft., with seventy Corinthian columns, each 45 ft. high, of which only twelve now exist, occurs at the convent of S. Dionysius in Montenegro; Building News *Journal*, 1870, xviii, 228. Architect *Journal*, 1870, ii, 9.

RHEGIUM; see Reggio, in Southern Italy.

RHEIMS; see Reims, in France.

RHEMISH or Rhenish Architecture. Batty, *Views*, 8vo., 1826. Wright, *The Rhine, etc., Illust.*, 4to. Gerning, *Tour. along the Rhine*, 4to., London, 1820, transl. by Black. Puttmann, *Kunstschätze und Baudenkmäler am Rhein*, 8vo., 1843. Eisenlohr, *Mittelalterliche Bauwerke*, fol., Carls., 1851-3. Hymans, *Le Rhin Monumental*, fol., Gand, 1863. Janscha, 50 *Vues du Rhin*, fol., Vienna, 1798. Lange, Poppel and Gaspey, *Rhine and Rhineland*, 8vo., 1846-7; 1855. Ring, *Etablissements Romaines*, 8vo., 1853. Dorow, *Römische Alterthümer*, 4to., Berl., 1826. Fourmois et Simonau, *Le Rhin Mont.*, fol., Gand, 1863. Lorimer, *Eccles. Arch. of the Rhenish provinces*, in Civil Engineer, *etc., Journal*, 1853, xvi, p. 81-3. Boisserée, *Denkmale 7 zum 13 Jahr.*, fol., Mun., 1830-33; 1842. Seddon, *Rambles in the Rhine provinces*, 4to., London, 1868. *Reparation of Rhine Ruins*, Building News *Journal*, 1873, xxv, 105. Châlons-sur-Marne, in Viollet le Duc, *Dict.*, s. v. Cathedral, p. 353. Ring, *Tombes Celtiques*, fol., Strasb., 1861. Bock, *Rheinlands Baudenkmale des Mittelalters*, 8vo., Col., 1868; and *Das Monumentale Rheinland, etc.*, Col., 1868.

RHENISH STANDARD MEASURE or Rhineland foot equal to 139·13 Paris lines or 0·3138 metre, or 11 ins. 7 lines about; it was used throughout Prussia in 1816. Whewell, *German Churches*, 8vo., London, 1842, p. 154, 225. Proportion.

RHINE PROVINCE; *Rheinpreussen* or Rhenish Prussia, is situated on both sides of the river Rhine, and comprises the grand duchy of the Lower Rhine, and the duchies of Juliers, Cleves, and Berg. It was formerly divided into two provinces, the Upper and Lower Rhine. It contains the five governments of Cologne, Düsseldorf, Coblentz, Treves, and Aachen. The area is about 10,230 square miles. Bridges over the Rhine at Cologne, at Kehl near Strasbourg, and at Mainz, are described by Crawford, at Inst. of Civil Engineers, *Proceedings*, 1866; and in Civil Engineer, etc., *Journal*, xxix, 355-6.

Golberry et Schweighauser, *Antiq. de l'Alsace, ou Mons. des dép. du haut et bas Rhin*, fol., Paris, 1826-8. Aufschlager, *L'Alsace*, 8vo., Stras., 1826; giving a long list of publications. De Caumont, *Rapport sur une excur. arch. en Lorraine, etc.*, 8vo., 1851. Laguille, *Hist. de la province d'Alsace*, fol., Stras., 1727. Merian, *Hist.*, fol., Frank., 1640-61. Schoepflinus, *Alsatia illust., Celt., Rom., Franc.*, fol., Colmar, 1751. Coste, *L'Alsace Romaine*, 8vo. Gerard, *L'Ancienne Alsace*, 8vo., Colmar, 1862; and *Artistes de l'Alsace pendant le Moyen Age*, 8vo., (1873).

RHÒ (Gabriele da), is mentioned as engaged on the works at Milan cathedral, 26 March 1401. 27.

RHODES (anc. Rhodus). An island and city in the Mediterranean sea off the coast of Caria (now Anatolia) in Asia Minor. Lindus, Camirus, and Jalysus, in Rhodes, with Cos, Halicarnassus, and Cnidus, formed a confederacy, which up to B.C. 776 had founded many colonies, as Rhode in Iberia, Gela in Sicily, Parthenope and others among the Osci in Italy, Corydalla and Phaselis in Lycia, and Soli in Cilicia. It declined during the Persian and Peloponnesian wars. The city itself was formed B.C. 408 by collecting the inhabitants of the three old cities, and was planned, sloping gradually down to the sea, by Hippodamus of Miletus, who also formed Munychia in the Piræus, near Athens. Vitruvius, ii, 8, relates how Artemisia after the death (B.C. 353) of her husband Mausolus took Rhodes by stratagem. The Rhodians submitted to Alexander; after his death they attached themselves to Ptolemey Soter; Rhodes was besieged for Antigonus, by Demetrius Poliorcetes, who was repulsed B.C. 303. Diognetus of Rhodes, Callias of Aradus, and Epimachus of Athens, are noticed by Vitruvius, x, 22, as concerned in the siege. It was one of the last states which surrendered to the Roman arms. About B.C. 278 was raised the brazen statue of Apollo or of the Sun, 70 cubits or 105 Engl. ft. high, celebrated as the colossus of Rhodes (Pliny, xxxiv, c. 7); it was begun by Chares of Lindus a pupil of Lysippus, and completed in twelve years by Laches of Lindus; it was destroyed by an earthquake fifty-six years later; its fragments were collected A D. 655 or 672 by Moaviah the Saracen general, and sold to a jew of Edessa, who is said to have laden 900 camels with the metal. 3,000 other statues adorned the city. There are no remains at Rhodes earlier than the time of the knights; a few ruins mark the site of Lindus.

In 1310, Fulke de Villaret, grandmaster of the knights of S. John of Jerusalem, making himself master of the island, it became the place of residence of the order until its expulsion in June 1522, when it became part of the Turkish empire under Suleiman the magnificent. The castle of the order exists, con-

taining the cells or houses of the knights in one street; with their hospital, a quadrangle having a double cloister; and the city walls. The palace of the grandmaster, with the church of S. John, Italian Gothic, converted into a mosque, were much damaged by an explosion 6 Nov. 1856; view of the ruins in ILLUSTRATED LONDON NEWS, Jan. 3, 1857, xxix, 683. The cathedral with curiously carved wood doors, was in a very perfect state when visited 1801 by Dr. CLARKE, and retained its portcullises and drawbridge. There are portions of several other churches, including that of S. Katherine, French Gothic, in good preservation. The earthquakes of 22-30 April 1863 caused great damage throughout the island; BUILDER *Journal*, xxi, 377.

The ancient Rhodian method of making white lead, verdigrease, red lead, and purple, are related by VITRUVIUS, chap. vii, xii and xiii. *Rhodian Ware*, in BUILDER *Journal*, 1862, xx, 692. CAOURSIN, vice-chancellor of the order, *Historia von Rhodis*, history of the 1480 siege, with woodcuts of the harbour, fol., Ulm, 1490; fol., Strassburg, 1513; SESTINI, *Mon. Vet.*, p. 91. DAPPER, *History of the Archipelago*, fol., Amsterdam, 1688, and in French, fol., Amst., 1703; and 1730. ALLAN, *Mediterranean*, 4to., London, 1834, p. 41. CORONELLI, *Isola de Rodi*, etc., 8vo., Ven., 1688. BRUYN, *Voyage en Levant*, 4to., 1725. MEURSIUS, *Opera*, fol., Flor., 1741-63. VERTOT, *Chevaliers de S. Jéan*, 4to., Paris, 1726. ROTTIER, *Descr. des Mons. de R.*, 75 pl., 4to., Brux., 1828-30. ROSS, *Reisen auf den Griech. Inscr.*, iii, 70-113, a good account of the mediæval period, and present condition. NEWTON, *Discoveries in the Levant*, 8vo., Lond., 1865. GUÉRIN, *Voyage dans l'île de R.*, Paris, 1856. PAULSEN, *Descr. Rhodi Maced.*, Gott., 1818. ROST, *Rhodus, ein Hist. Arch. Fragment*, Altona, 1823. MENGE, *Vorg. von Rhodus*, Col., 1827. MÜLLER, *Doric Race*, 8vo., Berlin, 1820-3. COSTE, *Souvenirs de Voyages*, 8vo., Paris, 1878, i, 432 view. MURRAY, *Handbook to Mediterranean*, 1881. 3. 14. 23. 28. 50.

RHODES; see DIOGNETUS of Rhodes.

RHODES (HENRY), was 1795 a pupil of W. Porden. In 1808 he was appointed architect and surveyor to the office of Woods and Forests; 1831 he and T. Chawner (retired 1845) were appointed joint architects and surveyors of the Woods, Forests, and Land Revenue; and retiring on a pension in 1840, was succeeded by James Pennethorne. With T. Chawner he designed Cox's hotel, Jermyn Street; and stabling at corner of the Haymarket and Coventry Street. 1817-20 rebuilt Egham church at a cost of £6,720; designed the new buildings for messrs. Hancock and Rixon, glass factory, in Pall Mall East facing westwards to the statue (ELMES and LEEDS, *Nineteenth Century*, p. 155); and Halton church, Buckinghamshire. He died 27 Jan. 1846. His library and collection were sold by messrs. Christie 24 March and following days. BUILDER *Journal*, 1846, v. 58.

RHODEZ; see RODEZ, in France.

RHODIAN PERISTYLE or peristylium Rhodiacum. "If a perystilium have one portico higher than the rest, it is called a Rhodian portico"; VITRUVIUS, vi, 10. 2. 6.

RHŒCUS of Samos, fl. *cir.* B.C. 640-600, also a sculptor, was a son of one Philæus. He rebuilt with his son Theodorus the temple to Rhea or Hera, at Samos, exceeding in grandeur all that had been seen by HERODOTUS, *Thalia*, iii, 60. It was decastyle, dipteral, about 344 ft. by 166 ft.; the diameter of the outer doric columns being 6 ft. 5·4; but no satisfactory idea can be formed of the plan; PAUSANIAS, vii, 4; viii, 14; ix, 41. VITRUVIUS, vii, præf., notices a treatise by one Theodorus *On the Temple of Juno at Samos;* it is now ascribed to a later age. In conjunction with Smilis of Ægina, and Theodorus, he formed the labyrinth at Lemnos; PLINY, xxxvi, 13, 19, a passage corrected by HEYNE, *Opusc. Acad.*, v, 342, approved by MÜLLER, *Ægina*, 99, and *Arch. d. Kunst*, § 60, and others. Rhœcus is said to have invented about B.C. 640 to 560 the art of casting in bronze and iron (PAUS.; PLINY, xxxv, 12; WELCKER, *Ad. Philostr.*, 196). SILLIG, *Dict. of Artists*, 8vo., London, 1836. Theodorus and Rhœcus are stated to have been the architects of the first temple at Ephesus, built about B.C. 600 by the Ionians. 3. 5. 59.

RHOLUS. An error for Rhœcus. 3.

RHONE or ROANE. A Scotch term for eaves spouting.

RHOPOGRAPHER; see RHYPAROGRAPHUS.

RHYPAROGRAPHUS. A painter of low, coarse, and trivial subjects, such as scenes of ordinary life, interiors of barbers' shops, cobblers' stalls, animals, and objects of still life. PLINY, *N.H.*, xxxv, 37. VITRUVIUS, vii, 5. Such subjects were bought by a certain class of the Romans at very high prices. PITTURE D'ERCOLANO, fol., Naples, 1762, iii, pl. 43, gives an example. POMPEII. ROPOGRAPHY.

RHYTON. The Gr. term for a drinking cup mostly terminating in the head of an animal; it can only stand when inverted. MARRYAT, *Hist. of Pottery*, 8vo., Lond., 1857; 3rd edit., 1868.

RIANNO (DIEGO DE) or RIAÑO, was employed from 1522 as maestro mayor to the cathedral at Seville until his death 16 April 1535, when he was succeeded by M. de Gainza, then aperejador, who carried out Riaño's design for the chapter house and two sacristies. He is specially noticed as having designed 1530 the Gothic *sacristía* de los calices, the plateresque or Renaissance *sacristía mayor*, and the modern Italian chapter house. 66.

RIB. (It. *costola;* Fr. *nervure; arceau;* Ger. *rippe*). Any curved piece of material, or an arch-formed piece, to sustain the plaster, stone, brick, tufo, wood, or other work of a vault. ANGLE RIB. CROSS RIB. BACK OF A RIB. JACK RIB. BEAM. BRACKET. BRIDGE. DOME. RIB-VAULT. VAULT. STONE RIB. Publications on *Carpentry* and *Masonry*. 1. 16. 17. 19.

RIBA or RIVA, (FELIX DE LA), 1682, assisted in constructing at Madrid, the bridge of Toledo over the river Manzanares with Juan Septiem and others. 66.

RIBAND. A piece of fir nailed to the timbers of a square body under which shores are fixed.

RIBAND spiral pillar, post, and column, made of wrought iron under the patent 1872 of Lee and Rogers, and forming a sort of open lattice work riveted at the crossings, giving a maximum of strength with a minimum of material. BUILDING NEWS *Journal*, 1872, xxiii, 28. BUILDER *Journal*, 1873, xxxi, 872.

RIBAND LETTERS, ribband or ribbon. Specimens dated 1547 are given in SHAW, *Alphabets*, 4to., London, 1853, pl. 24-6. "The ribband in stone for an inscription shams parchment. The legend should run architecturally on a flat surface and on a straight line"; ECCLESIOLOGIST *Journal*, 1849, ix, 199.

RIBAS or RIVAS (GASPAR DE). A famous sculptor of retablos, *cir.* 1642 in Spain; his son FRANCISCO DE RIBAS, 1694, with other maestros reported with F. de Quesada, ingeniero mayor del rey, on the security of the building of the colegiata de S. Salvador at Seville; and was also a sculptor. 65. 66.

RIBAS PUENTE (JUAN DE), 1690-1, was concerned on the bridge of Toledo; see RIBA (F. DE). 66.

RIBBAND; see RIBAND.

RIBBED DOME. It has been contended that a rib so placed renders the dome more of the nature of a vault, as it destroys the intimate connection of the several courses. Papers on *Domes*, read at Inst. of British Architects, 1857 and 1859; and 1871. 1.

RIBBET; see RABATE and REBATE. The recess in a wall to receive the shutter of a door or window as it folds back when opened. 2.

RIBBING. The whole of the timber work for sustaining a ceiling formed to represent a vault or cove.

RIBBING NAIL. A nail formerly made to fasten the ribs of ships in their place in building; when made right this nail held fast and drew easy without injuring the ribbing or timbers. It was therefore useful for temporary works. The size ranged from 5 ins. to 9 ins. in length, running by half inches. 4.

RIB BRIDGE. The arches of mediæval bridges were formed on chamfered ribs of great thickness. Trussed and arched rib bridge of timber, 84 ft. span over the Oneida Creek on the Utica and Syracuse railway, by O. H. Lee; (DUGGAN, *Specimens*, fol., New York, 1850; ALLGEMEINE BAUZEITUNG, Ser. i, pl. 643;

and in DEMPSEY); the bridge over the river Mohawk, of 100 ft. span, by O. H. Lee, is also given in DUGGAN. The timber bridges by J. U. Grubenmann, Wiebeking, and many others, are on the rib system: as are also a large number of iron bridges of former date. Iron rib bridge at Lumes over the river Meuse; ANNALES DE LA CONSTRUCTION, fol., Paris, 1858, iv, pl. 25-8.

Open timber ribs or framing, by Morris, BUILDING NEWS *Journal*, 1878, xxxiv, 405, 637. Iron ribs of Corn Exchange, by I'ANSON, *idem*, 623. Iron ribbed structures; *idem*, 1874, xxvii, 688. BENT TIMBER. BOW AND STRING. LAMINATED RIB.

RIBELLES Y DALMAU (BARTOLOME), born 11th December 1743, at Valencia; studied in the Royal Academy of San Carlos, where 21 Oct. 1770 he passed as architect; and 4 March 1781 the Royal Academy of S. Fernando gave him the title of "de mérito". Among his works are the capilla de N. S. del Populo in the district of Cuart; the camarin del S. Cristo del Grao at Valencia; the new entrance, cloister, and infirmary of the royal convent of S. Domingo in the same city; the excavation for, and new direction of, the great aqueduct of Castellon de la Plana; the presbytery and choir of the parish church of Almansa with the decoration of the great nave; and the design for the reservoir (*pantano*) of that town. He directed all the works for the greater portion of several high roads, as from Valencia to Barcelona; of Orihuela united with the new road from Valencia to Madrid; others near Fuente la Higuera; at the port of Beniganin; from S. Felipe to Alicante; and from Castellon de la Plana to the Ebro, which, with a large number of designs for other engineering works, are described in LLAGUNO. He died 27 February 1795 at Valencia, in his fifty-first year. 66.

RIBERA (PEDRO DE), *maestro mayor* of Madrid, where he designed and directed the whole of the large barracks of the corpo de guardia; the principal or eastern façade has the "ridiculous" portal; the tobacco store, to which Churriguera designed the porch (or perhaps the whole building, now the *real academia* de S. Fernando, is his design); the hospital of S. Bilbao y Aguirre; 1725 the huge seminario de nobles directed by the Jesuits; the hermitage de nuestra señora del Puerto in the river Manzanares for the marquis Vadillo; 1726 the façade to the hospital of S. Fernando (el hospicio) founded 1688; the church de los Irlandeses in la calle de Humilladero; that of S. Antonio Abad in la calle de Hortaleza, now occupied by the padres de la Escuela pia; and that of the Benedictines of Montserrat with its strange tower and façade, in la calle de S. Bernardo. After the death (1725) of Churriguera, he designed the church of S. Cayetano; 1737 the badly contrived theatre in la calle de la Cruz for 1,300 persons; the fountains in the Puerta del Sol, Red de S. Luis, plazuela de Anton Martin, and calle de S. Juan; the houses of the marques de Malpica, the condesa de Torre-hermosa, the duque de Montellano, the duque de Arcos, of don Fernando Verdes Montenegro, and others; and 1725 the theatre to the Buen-Retiro (or rebuilt 1770, as in DUMONT, *Parallèle de Plans, etc.*, fol., Paris, n.d.)

Among other works that do not exist are the ancient port of S. Vincente; the walk from the hermitage de nuestra Señora del Puerto to Camino del Pardo, with its fountains, wells, pumps, and plantations; the fountain of La Salud in la Tela; and that of las Damas in La Florida; and in el Pardo the barracks of the body guard; at Avila, the capilla de nuestra Señora de la Porteria for the marquis of Alcañices; at Ugena, another chapel of the same title for the duque de Nájera; at las Batuecas, the palace of the duque de Alba; and the stone bridge that was over the river Guadarrama on the road to the Escurial.

"He filled Madrid with a number of designs that have become the opprobrium of Europe"; CHURRIGUERESQUE STYLE; and has been called "the heresiarch Pedro Ribera". His death is not stated: his name rarely occurs in biographical works. 66.

RIBERO (NICOLAS), "arquitecto de la mitra de Toledo", designed 1559-71 and directed the church at Yunquera, in the diocese of Toledo. MEDINA (P. DE). JUAN DEL RIBERO, his nephew, was 1571 also employed there with other maestros. 66.

RIBERO RADA (JUAN DE), was maestro mayor at the cathedral at Leon; 1545 at Exlonza, near Leon, he directed the works of the cloister; and 1572 those of the Benedictine monastery; in 1586 Rodrigo de Margote was *aparejador* to Ribero at these works; 1554-60 at Salamanca, he continued the works (began 1524 by J. de Alava) at the church of the Dominican monastery of S. Esteban, and was succeeded 1600 by P. Gutierrez; and 1589 directed those of the cathedral begun by Juan Gil de Hontanon; 1554 at Valladolid, the tower, and part of the cloister of the church of S. Benito el real; 1585 at Leon, the casa (consistorial or) del ayuntamiento with two towers; 1582-1600 begun the large church of the Benedictines of S. Cloyo (Claudio); and 1588 consulted with M. de Vergara, J. de Nantes or de Enantes, and others, on the designs of Rodrigo Gil as to the designs for the cathedral at Salamanca, where his own design was preferred. He died in or about 1600. GIL GONZALEZ, *Historia de Salamanca*. 66.

RIB-SAW. A handle having fixed to it two long narrow and thin iron plates in one of which an opening is made for the reception of a wedge, and called the "box". 1.

RIB-VAULTING. (Fr. *côte*, 5, 25; *tranche*, 16). This forms the divisions in almost any system of vaulting, and is plain, chamfered, or moulded, as desired. The absence of the "ridge rib" is generally a proof of early date. BUILDING NEWS *Journal*, 1876, xxx, 536; 557. SCOTT, *Lectures on Arch.*, 8vo., London, 1878-9. VIOLLET LE DUC, *Dict.*, s.v. Construction, p. 91. VAULT. 1.

RICAMATORE (GIOVANNI), usually known as Giov. da Udine and G. de' Nanni; and il Ricamatori, Giov. Recamador, and 1534 G. de' Ricamatori, also a painter and stuccoist, born 27 Oct. 1487 at Udine, was son of Francesco. He studied at Venice under Giorgione da Castel Franco; spent some years in Rome in Raffaelle's studio, and was with him at the time of the discovery of the arabesques at the baths of Titus, which he carefully studied, and discovered the manner of making the stucco; he decorated the loggie of the Vatican with similar works, shown in the engravings of SANTI BARTOLI, VOLPATO, and OTTAVIANI. He also decorated other palaces at Rome and Florence; and designed a few and not important works. He died in 1564. MANIAGO, *Storia-Friuliani*, 8vo., Udine, 1823, p. 110-123; 154; 241; 364. MANIAGO, *Guida da Udine*, 8vo., San Vito, 1840, pp. 20, 22, 26, 38, 47, 53, 64, 101, 104. VASARI, *Lives*, 8vo., Lond., 1852, v, 16-32.

RICARD DE MONTFERRAND (AUGUSTE), chevalier, born 24 (not 4th) January 1786, at Chaillot; became a scholar of Percier and Fontaine at Paris, where he was engaged upon the temple de la Victoire, now the église de la Madeleine. Leaving Paris 1816 he went to Rome, and shortly afterwards to S. Petersburg, where he designed the palace for prince Labanoff, now that of the minister of war; and the hôtel Demidoff. In 1817 he was successful in the competition for rebuilding the large church of S. Isaac, which he carried out, and published *Eglise Cathédrale de S. Isaac*, fol., S. Peters., 1845-8; it was completed after his death by L. von Klenze. A plan of Catherinehov as amended 1824 by him is bound up with a copy of *Nouvelle Collection de Vues de S. P.*, fol., 1826, in the British Museum. In 1826 he designed the theatre on Aplugin island; in 1829 he designed, and carried out 1831-4 the column to the memory of emperor Alexander I, described in *Plans et détails du Mont., etc.*, fol., Paris, 1836; ALLGEMEINE BAUZEITUNG, 1836, pl. 86-8. For this work he received the order of S. Vladimir, £5,000, and a pension of £240. He restored the interior of the *Winter* palace after the fire of 1837-8, but this work is usually attributed to Bruilov and Starov, and built (?) by Kleinmichael; also the chapel at the admiralty; and at Moscow raised the great bell on to a pedestal; *Descr. de la Grande Cloche de M.*, fol., Paris, 1840. His last public work, 1856-59, was the pedestal for the equestrian statue by baron Klodt, of the emperor Nicholas; BUILDER *Journal*, 1862, xx, 371-4. He died probably 11 July, 1858 (not 14 July 1859 as in LANCE), at S. Petersburg. *L'Illustration* for 21 Aug.

1858 gives a portrait and a short memoir. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856. ROYAL INST. OF BRIT. ARCHTS., *Report*, 1859, p. 28; of which Society he was an hon. and corr. member, elected 1842. He died (28 June) 10 July. 113.

RICCA (ANTONIO), of Oneglia, designed 1713 the palazzo dell' università at Turin; and 1731 the church of S. Torpete at Genoa.

RICCA (GIOVANNI BATTISTA), of Oneglia, practised 1750-80 at Genoa, where he designed many churches and palaces. 68.

RICCHINI or RICHINO (FRANCESCO MARIA), was employed 21 March 1605 until his dismissal 29 July 1638 at Milan cathedral, where he continued the rich Italian details following the example set by P. Pellegrini. In 1621 he designed the central portion of the ospedale maggiore, together with F. Mangone and C. Buzzi, who planned the great quadrangle; part of the arcade in BUILDER *Journal*, 1851, ix, 121-2; 1631 the palazzo Annone of a peculiar yet majestic character; CASSINA, *Fabbriche di Milano*, fol., Milan, 1840-44; palazzo Litta (or by G. Piermarini) one of the finest in the city; 1631 restored cleverly the *atrium* erected 868-81 of S. Ambrogio, preserving all the old features; 1632-54 designed the church of S. Antonio Abate; and is said to have completed or restored the church of S. Eustorgio, arranged 1450 by T. Rodario or Lombardino; and 1658 (?) completed the campanile erected between 1279 and 1309. He died 1652. ALLEGRANZA, *Inscrip. Sepul.* 4to., Milan, 1773. FERRERI, *Life of Bassi*, p. 16. MILAN. 26. 68.

His son GIOVANNI DOMENICO restored the church and nunnery of the Dominican and church of S. Giovanni. LATAUDA, *Descr. di Milano*, 8vo., Milan, 1737-8. 68.

RICCI (ANTONIO); see RICCIO (A.)

RICCIARELLI (DANIELLO), of Volterra, born *cir.* 1491, was chiefly a painter, stuccoist, and sculptor, became a pupil of B. Peruzzi, and was sent by Michelangelo to act as overseer at S. Pietro at Rome, but instead of accepting him the commissioners appointed Nanni di Baccio Bigio; VASARI, *Lives*, edit., 1851-2, iv, 115; v, 162-79; 330; 337. He modelled and cast in bronze the equestrian statue of Henry, king of France, at Paris. He died 4 April 1566, aged 57 years as stated. 5.

RICCIARELLI (LIONARDO), nephew of the above, was also a celebrated stuccoist. He restored 1574 the cathedral at Volterra, adding the Corinthian capitals, and the armorial bearings in the side ailes. VASARI, *Lives*, edit. 1852, v, 174-5. 28.

RICCIO (ANDREA), of Padua, living about 1400, carved the fine statues of Adam and Eve in the niches in the gateway at the foot of the stairs at the Ducal palace at Venice; ZANOTTO, *Il palazzo ducale*, 4to., Ven., 1842-6, i, pl. 17-8. 5.

RICCIO (ANDREA), il Riccio, il Crispo (Crispus), and Briosco, born 1470 at Brescia (VASARI, *Lives*, 8vo., London, 1850, ii, 63, 73, and inscription on tomb), or 1469, or 1459 according to GIULIANELLI, or 1460 at Padua; became a pupil of the sculptor Bellano or Vellano of Padua. The church of S. Giustina at Padua was continued from about 1516 or 1521 by him, and by Andrea MORONE 1532-49; MILIZIA adds, with A. Leopardo of Venice. Briosco also designed the tomb of Gir. and Marcantonio della Torre in the church of S. Fermo maggiore at Verona, given in CICOGNARA, *Storia*, ii, 141, pl. 36-7; some of the bassi-relievi from which are now in the Louvre at Paris. He died 8 July 1532, and was buried in the cemetery of S. Giovanni in Verdara at Padua; with an inscription given in VASARI, ut sup. BRESCIA (G. da). 3. 26. 68.

RICCIO (ANDREA), of Padua, executed 1564 the great bronze candelabrum or paschal candlestick in the chapel of S. Felice in the church of S. Antonio in that city, the work of ten years, as settled by MORELLI; CICOGNARA, *Storia della Scultura*, fol., Venice, 1813-18, ii, 133-48, pl. 35-6. Two bronze panels (out of twelve) in the church are attributed to "Andrea Crispo Briosio detto il Riccio" who executed the candelabrum, in WOODS, *Letters*, 4to., 1818, i, 247. ALLGEMEINE BAUZEITUNG, 4to., 1849, p. 76. 26.

These four names appear to have created some confusion among writers; SELVATICO, *Scultura in Venezia*, 8vo., 1847, p. 178-84.

RICCIO and RIZZO (ANTONIO), called Briosco, of Verona, with Piccino restored after the fire of 1420 the palazzo della ragione at Padua, adding the round arch external and lower arcades; also repairing etc., and forming the hall from three rooms into one (PADOVA; COZZO); he is stated by WORNUM, *Cat. of Ornamental Casts*, 8vo., London, 1854, to have designed 1485-1500 the scala dei giganti in the cortile of the ducal palace at Venice; as discovered by CADORIN, *Pareri*, 8vo., Venice, 1838, p. 132, who also includes the adjoining façade next the rio di palazzo of the cortile. They are usually attributed to Antonio Bregno (contemporary with Scarpagnino) of Venice or Verona, called il Riccio or Rizzo (the scamp, he bolted from Venice 1498), as *protomastro*. Other writers ascribe to Bregno the façade next the canal and against which the work internally of Briosco is placed. He was consulted 1496-8 with Giulio Romano (Pippi) on the loggia and council-house in the piazza degli signori at Vicenza; ARNALDI, *delle Basiliche*, 4to, Vic., 1769, xxxi; xxxviii, etc. DIEDO AND CICOGNARA, *Fabbriche*, fol., Venice, 1838-40, i, 57, pl. 29, etc. SANSOVINO, *Venetia descritta*, 4to., Ven., 1663, p. 320. MAFFEI, *Verona Illust.*, 4to., Ver., 1731, iii, 144. ANTONELLI, *Collezione—Ornamenti Antichi*, fol., Ven., 1831. CALENDARIO. P. LOMBARDO. 5. 30.

RICCIO (IL, and MAESTRO). Name given to Bart. Neroni or Negroni, of Siena; VASARI, *Lives*, 8vo., London, 1851, iv, 470.

RICH AND POOR LIME; see LIME.

RICHARD (ALEXANDRE), a jacobin, directed 1658-76 the construction of the portail of the church of his monastery at Lyon; the foundations had been laid 1657 by Robert Rogier. Le Pautre has engraved it. LEYMARIE, *Lyon anc. et mod.*

RICHARDS (.....), designed Saunders hill, near Padstow, Cornwall, for Thomas Rawlings, esq., who died 1820; NEALE, *Seats*, 4to., 1825, ii, 2nd ser.

RICHARDS (GEORGE), translated Palladio's *First Book of Architecture*; with an *appendix touching doors and windows*, by P. le Muet; also *Rules for roofs*, by W. Pope; and *Designs for floors, etc.*, small 4to., London, 1663; 1676, 3rd edit.; 1724, 10th edit.; 1733, 12th edit.

RICHARDSON (CHARLES JAMES), a pupil of Sir John Soane, and therefore claimed to be almost one of Joseph Gandy who was then in Soane's office. He published the following works: *Architectural Remains of the reigns of Elizabeth and James I, from measurements*, 31 pl., fol., 1836; 1838-40; 1849: *Observations on the Architecture of England during the reigns of Elizabeth and James I*, 60 pl. 4to., 1837: *Design for economically raising Holborn Valley*, fol., (1837); and again 1863: *Holbein's ceiling, Chapel Royal, St. James's*, fol., (1837): *A Popular Treatise on the Warming, etc., of Buildings* (Perkins, system), 21 pl., 8vo., 1837; 1839; 1856, 3rd edit.: *Descr. of the Warming etc., apparatus*, 8vo., 1839: *Studies from old English Mansions; their furniture, gold and silver plate*, 140 pl., 4 vols., fol., 1841-48: *Letter with drawing of the Sandal-wood gates of Somnath* (ARCHÆOLOGIA), 4to., 1843: *The Workman's Guide to the Study of Old English Architecture*, fol., 1845: *A Letter to the Council of the Head Government School of Design*, 8vo., 1846: *Studies of Ornamental Design*, 40 pl., fol., 1848; 1852: *Hall of the Middle Temple*, in WEALE, *Quarterly Papers*, 4to., 1848: *The Smoke Nuisance, and its Remedy*, 8vo., 1869: *Englishman's House, from a Cottage to a Mansion*, 600 illust., 8vo., 1870; (1871); 1875, 3rd edit.; and *Picturesque Designs for Mansions, Villas, Lodges, etc.*, 1870.

In the library at the South Kensington Museum are several volumes by Richardson; 1, a book of Tracings from original drawings by Sir J. Vanbrugh, R. Adam, J. Thorpe, and C. H. Tatham; and 2, Collection of Architectural Drawings numbering 549; 3, Original Drawings, etc., of Elizabethan buildings, furniture, plate, etc., in 4 vols.; 4, Pencil rubbings of old English ornament, chiefly Elizabethan style, 1830-58; and 5, Old title-pages, ornaments, etc. In Sir J. Soane's museum is a sketch-book of *views and details* of his residence at Ealing; various pupil and lecture drawings, in the Soane "Pennant"; and archi-

tectural lecture drawings, all by C. J. Richardson. In the British Museum is a *Collection of proof prints, etc.*, from the BUILDER *Journal*, 2 vols., fol., 1846. He was master of the architectural class in the school of design at Somerset House from Oct. 7, 1845 until some time in 1852. In 1852 he designed the mansion in Kensington palace gardens for the earl of Harrington; 1853, various works at Belsize park, Hampstead; and 1856 carried out a block of mansions, Queen's gate, Hyde park, for W. Jackson; BUILDER *Journal*, xix, 109; BUILDING NEWS *Journal*, iii, 851; iv, 931; v, 879. He died about 1872.

RICHARDSON (GEORGE), appears to have travelled in France and Italy 1760-63; and obtained 1765 a reward at the Society of Arts for a design (being then under thirty years of age; DOSSIE, *Memoirs*, 8vo., London, 1782, iii, 421). He exhibited 1766 and 1768 at the Society of Artists of Great Britain; and in the Royal Academy of Arts, 1774 designs for a carpet and ceilings; 1776 ceiling of Grecian hall at Keddlestone; 1783 church at Stapleford, Leicestershire for earl of Harborough; and down to 1793. He published *Statues, Bas reliefs, Drawings, and Pictures in Italy, France, etc., with remarks*, 17...; 1754, 2nd edit.: *Ædes Pembrochianæ*, 8vo., London, 1774; 8vo., Salisbury 1798, 13th edit.: *A Book of Ornamented Ceilings, in the style of the Antique Grotesque*, 48 pl., fol., 1776; 1781; 1793, 2nd edit., col. pl.: *Iconology; or a Collection of Emblematical Figures*, 2 vols., 109 pl., 4to., London, 1779: *A new collection of Chimney pieces*, 36 pl., fol., 1781: *Five Orders of Architecture; and Observations on the Antiquities at Rome, Pola, and South of France*, 1760-63, 22 pl., fol., 1787: *New Designs in Architecture*, 45 pl., fol., 1792; this work advertises his terms for teaching architecture: *New Designs of Vases, Tripods, etc.*, 25 pl., 4to., 1793: *Capitals of Columns and Friezes from the Antique*, obl. fol., 18 pl., 1793: *Original Designs for Country Seats or Villas*, 57 pl., fol., 1795: *The New Vitruvius Britannicus, Plans, etc., of Modern Buildings*, 2 vols., 142 pl., fol., 1802-8; 1808-10: and *Ornaments in the Grecian, Roman, and Etruscan Tastes*, 37 pl., fol., 17...; 1816. Drawings of coloured *Designs for Ceilings* are in Sir J. Soane's museum. The date of his death has not been ascertained. CIVIL ENGINEER, ETC., *Journal*, 1844, vii, 425: WILKINSON, *Londina Illustrata*, fol., London, 1819-25, s. v. Covent Garden theatre.

RICHARDSON (WILLIAM), probably the son of GEORGE, as their names are connected on the plates of *Vases*, etc., *Capitals*, etc., and *Ornaments*, etc., 1816; exhibited designs 1783-94 at the Royal Academy of Arts.

RICHE (LE); see ENGUERRAND; and BEAUVAIS, 1338.

RICHEL (PAUL DE), born in the province of Liège, designed and executed several public buildings, and repaired the walls and gates of Liège, where he was occupied in the restoration of the church of S. Martin, when he was assassinated 1560 by some masons jealous of his success. VILLENFAGNE D'INGIHOUL, *Recherches*, 8vo., Liège, 1817, ii, 354. DELVENNES, *Biog. des Pays Bas*, 8vo., Mons, 1829.

RICHER (JEAN), a pupil of le Vau, designed the hôtel de la comtesse d'Estrade (later of M. de Coullanges) rue de Cléry; BLONDEL, *Arch. Franç.*, fol., Paris, 1752-6, iii, 17, five plates: l'hôtel Pasquier, rue Bourg-l'abbé: hôtel d'Outremont, rue du cloître S. Mederic, opposite that of the consuls; iii, 3, pl. 3-6: maison de M. Henselin; ii, 131: and the door of the hôtel de Noailles, rue S. Honoré; iii, 134, pl. 3, also attributed to J. Marot, by whom most of the above were engraved. He died in 1670. THIÉRY, *Guide des Amateurs*, Paris, 1787. 5.

RICHIER (GEOFFROI), 1 Feb. 1452, was appointed master of the works at the cathedral at Rouen, succeeding Jean Roussel; he was succeeded, on his death March 1462, by G. Pontifz. His only known work, dated 1460-1, is the "fontaine de l'aitre" of the church. DEVILLE, *Revue des Architectes*, 8vo., Rouen, 1848, p. 34.

RICHMOND. The capital from 1780 of Virginia in the United States, having been founded 1737 by William Byrd, and incorporated 1742. It is situated on the Shockoe creek at its junction with the river James, and opposite to Manchester, which is a sort of suburb. There are five bridges, one of which 1836 by Moncure Robinson, C.E., is described s. v. LATTICE BRIDGE, but it failed. A bronze equestrian statue of Washington by Crawford has figures around it by six sculptors. There is also a marble statue of Henry Clay. The state house or capitol is considered an imitation of the temple at Nismes, but having Ionic columns on a basement with window openings; in the central open hall is a statue of Washington by Houdon of France; and a bust of Lafayette. On 27 April 1870, the floor 20 ft. by 25 ft., of the court of appeals, failed as described in TIMES *Newspaper* and BUILDER *Journal*, xxviii, 409. The city hall (Grecian); about fifty churches (1875); the governor's house; jail; court house, *cir.* 1815, by Robt. Mills, who also designed several private houses; custom house and post office; state armoury, 320 ft. by 280 ft.; penitentiary, a square of 300 ft. by 110 ft. inside; medical department of Hampdon Sydney college (Egyptian); Richmond college 1840 for Baptists; Roman catholic college of S. Vincent; theatre; and two markets; are all mentioned as of merit. One third of the business portion of the town was burnt April 1864. RIPLEY and DANA, *Amer. Cycl.*, 8vo., New York, 1875. 14. 50.

RICHINO (F. M.); see RICCHINI (F. M.).

RICHNESS and SIMPLICITY. These qualities are explained by GWILT, *Elements of Beauty in Architecture*, prefixed to his edition of CHAMBERS, *Decorative Part, etc.*, 8vo., London, 1825, i, 10-3. GARBETT, *Principles of Design*, 12mo., 1863. WOODS, *Letters*, 4to., London, 1828, i, 332.

RICHTER (JOHANN MORIZ), designed 1664 the Griesbach house, formerly the residence of the Saxon collateral branch; and Wilhelms schloss at Jena. He is much praised in BIERI, *Architectura Jenensis*. His two sons MORIZ and JOHANN laid out the town of Neu Erlangen. 68.

RICHTER (RUDOLPH HEINRICH), of Königstein in Meissen, was in 1730 made bau inspector when the palace of the margrave of Bayreuth, at Schwedt, was being built. Richter's drawings of this schloss and of others in the locality were engraved by Wolfgang in 1741 on twelve large plates. In 1756, on the erection of the academy at Bayreuth, Richter was appointed professor, and 1761 became rector; it was dissolved 1764. He died 1770 at Bayreuth. His son JOHANN RUDOLPH HEINRICH was born 1748 at Bayreuth, learnt drawing of his father, became pupil of Karl von Gontard, and scholar of the painter Krafft. He designed many edifices at Berlin, as *cir.* 1700 the Johanniter palace; also at Potsdam; and made many designs; and was königl. preussischer oberhofbaurath. He died in 1810. 68.

RICKEL (P..... DE), designed *cir.* 1513 the church of S. Martin at Liège, and completed 1542. LIÈGE. FLEMISH ARCHITECTURE.

RICKMAN (THOMAS), F.S.A., born June 8, 1776, at Maidenhead, was educated for the medical profession. In drawing he was self-taught; in 1794-97 he drew and coloured most minutely about 5,000 toy figures of costumes in the army, which he cut out and arranged in front of his architectural backgrounds of military buildings. He practised 1801-3 with his father at Lewes, Sussex; was engaged in the corn trade in London until 1808; and then became clerk to an insurance broker in Liverpool, resigning in Aug. 1818. The first note in his diary of sketching is 19 March 1809, when he "walked to Childwall to draw the church", then to Sefton, and other places; at Chester, Lamb Row he "conceived to be the oldest houses in England, having little doubt they were built before Edward III"; in 1810 he continued his visits, and "sent to Geo. Harrison of Chester my architectural work": 1811 visited neighbouring churches and Yorkshire, Lincolnshire, etc.; assisted to establish the Liverpool philosophical society, and from Sept. delivered at the society four lectures on architecture: Jan. 1812 visited London, Oxford, and Shrewsbury; and made many designs; July, sketching in four counties, etc.; Dec., wrote *Essay on*

Chester Cathedral for a society then established in Chester; Dec. was elected professor of architecture to the Liverpool academy, delivering seven lectures from March to May 1813, in which year, besides various designs he assisted in that for Everton church; Dec. 1813, and Jan. and Feb. 1814 he made a long tour in the eastern counties looking at churches for the *Appendix*, and on to York, Durham, Newcastle, Edinburgh and Aberdeen; made various designs; as also in 1816 and 1817; a tour in North Wales 1817; and 19 Dec. took a private office and a draughtsman; 1818 tour in Yorkshire, Lincolnshire, etc., and to London; in June Henry Hutchinson became a pupil; Aug., Rickman was summoned to London to attend the board of works; June 1819 gave evidence before a government commission at the houses of parliament; 27 July 1819 received instructions from the commissioners for building additional churches, for erecting S. George's church, Birmingham, and rebuilding S. Mary's, Barnsley; Jan. 1820 started an office at Birmingham to which Hutchinson went, who Dec. 1821 became partner; a brother, Edwin S. Rickman, became assistant at the Liverpool office, and partner for a while at Birmingham; (he left about 1834 and died 1873). Hutchinson died Nov. 1831 after much illness. R. C. Hussey, F.S.A., became partner early in 1835 and from that time Rickman's health prevented him from taking any considerable part in the management of the office.

Rickman wrote out April and July 1812 his lectures on "Architecture" for SMITH, *Panorama of Science and Art*, 2 vols., Liverpool, 1812-15, the author of it being acknowledged in the preface; it was reprinted in each of the nine editions up to 1823, London, 8vo. This essay, better known as *An Attempt to Discriminate the Styles of English Architecture from the Conquest to the Reformation*, etc., was reprinted in a detached form first in 1817; 2nd edit., 1819, with an *Appendix*, entitled *Enumeration of Buildings illustrating the Principles of English Architecture*, extended in some later editions: 1820 with additions; 1825, 2nd edit., with additions; 1825, 3rd edit., with very considerable additions; 1835, 4th edit., with very considerable additions, new plates, and containing *Some remarks on the Architecture of a Part of France;* in this edition the title was altered to *Styles of Architecture in England:* it also contains a list of buildings designed by him; [1848, 5th edit., with very considerable additions, etc., by J. H. Parker (the *Appendix* omitted); 1862, 6th edit. (*ditto*); and 1881, 7th edit., with considerable additions; chiefly historical, but some text omitted for a supplementary volume.] He also wrote *Four Letters on the Ecclesiastical Architecture of France and England*, for the ARCHÆOLOGIA, 1833, xxv; and *Further Observations*, in ARCHÆOLOGIA, 1834, xxvi; and with D. TURNER, he wrote a few notices to COTMAN, *Specimens of Architectural Remains in various Counties in England*, fol., London, 1838. Among the churches erected for the commissioners for building additional churches, and for private persons, are the following;—

1819. Runcorn church. 1819-21. Barnsley, S. George.
1819-21. Birkenhead, S. Mary. First stone 26 July. (since added to).
1819-22. Birmingham, S. George†. Decorated. 2,000 persons. £12,735.
1820-24. Chorley, S. George. 1822. Gloucester, Christ Church Spa.
1822. Erdington, near Birmingham, S. Barnabas (R. and H. H.)
1822-26. Hampton Lucy, Warwickshire, S. Peter† (since altered).
1823-25. Preston, S. Peter; and S. Paul.
1824-25. Glasgow, S. David or Rams Horn†. Early English. Very creditable. Specification prepared by James Cleland, sup. of public works.
1825. Ombersley church, Worcestershire.
1825-27. Mellor church†; Over Darwen church†; and Lower Darwen church†, all in parish of Blackburn.
1825-27. Birmingham; S. Peter, Dale End†. Greek Doric. 1,900 persons. £13,087. A medal was struck, and is given in *The Graphic Illustrator*, 4to., London, 1834, p. 77.
1826. Watt chapel, Handsworth, near Birmingham.
1826-28.*Carlisle. Chapel in parish of S. Cuthbert; *and chapel in parish of S. Mary.
1826-29. Birmingham; S. Thomas, Holloway Head church†. Greek Ionic. 2,125 persons. £14,222.
1826-29.*Coventry. Church added to the old tower of Grey Friars.
1827-29.*Oulton church and parsonage, near Leeds, for John Blayds, esq.
1827-30.*Pemberton new chapel, parish of Wigan.
1828.* Whittle-le-Woods church, Leyland, Lancashire.
1829.* Bristol. New chapel† in parish of S. Philip and S. Jacob.
1830. Carlisle. Christ. Early English: and Trinity, perpendicular.
1830.* Haigh and Aspul, new chapel, parish of Wigan.
1831.* Tockholes church, in the parish of Blackburn (last by R. and H. H.).
1831-33. Redditch, near Birmingham. Roman Catholic chapel.
1831-37. Stretton on Dunsmore church, Warwickshire. (1st stone 1835.)
1832. Saffron Walden, Essex. Belfry and spire to the church. £2,923. BUILDER *Journal*, 1854, xii, 375.
1833.* Birmingham; All Saints, Nineveh, (by T. and E. R.) Early English. 1,200 persons. £3,817.
1833-35.*Bristol. S. Matthew, Kingsdown (T. R.)
1834-37.*Bristol. Chapel and asylum for the blind (R. and R. C. H.)
1835.* Loughborough church, Leicestershire.
1838.* Snenton or Sneinton, near Nottingham. 1,240 sittings. £4,700. CIVIL ENGINEER, *etc.*, *Journal*, i, 146.
1837-38. Settle church, Yorkshire.
1838.* Horsley parish church, Gloucestershire (R. and R. C. H.)
1838.* Clevedon church, Somersetshire.
1838.* Hales Owen parish church, Shropshire (altered internally).
1838. Birmingham. Bishop Ryder's church. Tudor. 1,574 persons. £4,500. C.E., etc., *J.* ii, 28.
Earlier dates. Liverpool, S. Jude church; and Lower Hardress church, near Canterbury.

Among the civil and private buildings are;—

1815. At Liverpool; the residences of Colin Campbell, esq., and George Smith, esq.; and the Wellington rooms.
1820. Clithero Town Hall.
1823. Redmarley, Worcestershire; The Down House, for Mr. Dowdeswell.
1825. Preston Court House.
Near Dumfries; The Grove, for Wellwood Maxwell, esq.; and Terraughty, for.....
1825-27.*Cambridge. The new or fourth court† to S. John's college at a cost of £70,000; and bridge, 50 ft. span.
1827-28. Brunstock, near Carlisle, for George Saul, esq.
Burfield lodge, near Bristol, for Edward Bowles Fripp, esq.
1828.* Birmingham. Public News Room; additions. *Birmingham Society of Arts,† Exhibition and other rooms.
1828-29. Rose castle, Cumberland.† Restored for the Bishop of Carlisle.
Matfen, Northumberland, for Sir Edward Blackett, bart.
1829.* Carlisle. Draper's hall.
1830.* Carlisle News Room and Library; Decorated.
1830.* Birmingham Banking Company.
Baynard's park, Surrey; additions for rev. ..... Thurlow.
1831-36. Tettenhall Wood, Staffordshire, for Miss Hinckes.

The edifices marked * in both lists had printed specifications, copies of which were presented by R. C. Hussey to the Royal Institute of British Architects. Those marked † are stated to have been named on Hutchinson's monument at Hampton Lucy.

In 1823 R. and H. H., competed for King's college, Cambridge, one of five gothic designs, against fourteen classic; (*Catalogue* at R.I.B.A.). In 1829 placed third in the first competition (of four architects) for library and museums at Cambridge; and 1830 in second competition their design was chosen, a selected one by C. R. Cockerell not conforming to the new instructions; Rickman wrote, *Answer to Observations* (by G. Peacock) *on the Plans*, etc., 8vo., Birm., 1831. In 1836 R. and R. C. H. competed for the houses of parliament. His pupils comprised: ... Broadbent, G. Vose, D. R. Hill of Birmingham, A. H. Holme of Liverpool, Jonathan A. Bell of Edinburgh, Thos. Fulljames of Gloucester, and about 1833 ... Zugheer of Zurich, govt.-engineer, now all deceased; S. C. Fripp of Bristol; and John Smith of Cambridge. The late A. E. Perkins of Worcester was also in his office. Rickman died 4 January 1841, and was buried in S. George's churchyard, Birmingham, where a tomb was erected 1845 by several friends; BUILDER *Journal*, 1844, ii, 92. His son Thomas Miller Rickman, F.S.A., became a pupil of R. C. Hussey. LITERARY GAZETTE for 30 Jan. 1841. The *Journal* of the Arch., Archt., and Historic Society of Chester, pt. vii for Jan. 1860 to Dec. 1862, 8vo, Chester, 1864, p. 277-88, gives *Arch. Hist. of Chester Cath.*, being the *Essay* of 1812, together with a *Memoir* by (the then) canon Blomfield, partly from KNIGHT, *Cyc. of Biography*.

RICK STAND. Where oak is cheap, pillars of it are inserted in the ground and standing two feet high above it, carry a frame of joists; for small ricks the plan is round. Where stone is abundant, the stand is formed of a wall two feet high with a coping of stone or wood projecting at least 6 ins. over the wall outwards to obstruct the ascent of vermin, and the foundations a foot or more to prevent vermin burrowing. Where cast-iron is cheap, small pillars set on stone plinths, with cast-iron copings and joists have been used. Examples are shown in LOUDON, *Encyc. of Cottage, etc., Arch.*, 8vo., London, 1833, § 809-16. These supports are called "staddles" in some parts of England; also "rick stones".

RIDDYNG. Removing the foundation stones and ground to make way for a new building; as used 1448, in SURTEES SOCIETY, *Finchale Priory*, 8vo., Newc., 1837, p. 253; 382; 445.

RIDE. In extensive stabling, there is sometimes formed a covered shed round the entire quadrangle of the stable yard, serving as a continuous space for various uses, chiefly affording the means of exercising horses in bad weather and during sickness. It will be about 10 ft. wide, and may be planned in various ways, not only as regards construction, light, etc., but as to whether it shall be external or internal in its relation to the stable buildings. It must be circular on plan; or, if square, it must have widely rounded corners, to prevent accidents. An external one at Toddington, is given in KERR, *Gentleman's House*, 8vo., London, 1871, 3rd edit., p. 268, and pl. 15, from BRITTON, *Toddington*, 1840. A circular verandah designed 1809 by Loudon for Col. Mytton of Garth, Montgomeryshire, is given in his *Cottage, etc., Arch.*, 1833, § 1937, as 10 ft. wide, 15 ft. high, and nearly 200 ft. long. RIDING HOUSE.

RIDER'S SYSTEM of an iron lattice bridge, is shown in ALLGEMEINE BAUZEITUNG, 1852, pl. 481.

RIDES. A hinge; see HOOK AND BAND HINGE. 4.

RIDGE. The angular top of a work. CRADGE of an embankment. 1.

RIDGE. (It. *asinello; colmello; colmarreccio;* Sp. *cavallete de tejada;* Fr. *anusure* or *basque*, BLONDEL, *Cours*, iii, 256; *faîte; faîtage, crête;* Ger. *furst.*) The term FUST is used in Devonshire and perhaps in some other counties; MOXON, *Mech. Exercises*, 4to., London, 1694, p. 143 of Carpentry. The upper angle of a roof. The highest part of a building or of a roof. The meeting of the rafters on both sides of the house, and there either butted against each other; halved and spiked; or butted upon a transverse piece of wood called the RIDGE PIECE to carry the tiles or cresting, called also "roof tree". HOG-BACKED.

RIDGE. The intersection of two surfaces of a vaulted surface; WILLIS, *Arch. of the Middle Ages*, 8vo., Camb., 1835, p. 72. A round arched vaulting with a "raised ridge", and "a pointed arched vaulting with a raised ridge", are described by SCOTT, *Lectures*, 8vo., London, 1879, ii, 171; 187.

RIDGE CREST. The ornamentation of the ridge of a roof, either in metal work, or in pottery; as "ornamental tops to be inserted in grooved ridge tiles", of ordinary manufacture. CREST. HIPKNOB, *Detached Essay*, 1851-2, pt. 1.

RIDGE OF LEAD. (Fr. *enfaîtement; enfaîtien*, 5, 25, open ridge. Fr. *enfaîtement à jour*, 25. *L'endossure*, in GUENEBAULT, *Dict. Icon.*, 8vo., Paris, 1843, i, 429.) In roofs covered with lead, the upper sheets of lead are frequently turned down the opposite side of the roof, and are arranged so as to break bond by using sheets of differing lengths, in such case a special ridge-roll is not used. When the ridge of lead is fixed separately, it should be not only securely dressed round the wood-roll, but the lower edges held down by bands of 8 lbs. lead, 4 ins. wide, securely nailed to the woodwork of the roof. Upon some of the continental cathedrals a further precaution is adopted of mortising the ridge of lead and the wood ridge-piece, thus allowing of a strip of 8 lbs. lead, 5 ins. wide, being passed through all, the ends of the lead key being dressed down and soldered to the lead ridge. R. R. R.

RIDGE PIECE (Lat. *columen*); called "first piece" in Lancashire; RIDGE. The upright piece of wood transversely to the head of the rafters and to which they are affixed. It is absent in early Gothic roofs. Formerly the ridge was a squared piece of timber, on which the "cresting" was fixed. The top of it is now usually rounded in common work, to receive the roll of lead. RIDGE ROLL.

RIDGE RIB in vaulting. GARBETT, *Principles of Design*, 12mo., London, 1863, p. 164-179. RIB VAULTING. VAULT.

RIDGE ROLL. (Fr. *bourseau*, 25; or *boursaut*, BLONDEL, *Cours*, iii, 256.) The wood bead sometimes of greater diameter than the thickness of the ridge-piece, but sometimes formed out of it, round which the lead ridge is dressed to keep it firmly in position during gales of wind; it is often fastened on with ridge spikes, so that it is kept from direct contact with the ridge-piece whereby the lead has a greater grip round the roll. R. R. R.

RIDGE SPIKE. A small piece of wrought-iron spiked at both ends with a shoulder on each of the opposite edges at differing levels. A hole being bored into the upper edge of a wood ridge-piece, the ridge-spike is driven in until the lower shoulder, acting as a gauge, rests upon the wood; the upper shoulder receives the blows of the hammer, and forms a gauge upon which the ridge-roll rests. In very exposed situations the spikes are made long enough to pass through the ridge-piece and the roll, and are there clenched. R. R. R.

RIDGE TILE or RIDGING. (Fr. *faîtière; tuile faîtière*, 25; Fr. *pignon*, the roll over adjoining tile, VIOLLET LE DUC, *Dict.*, p. 128). A convex tile made for covering the ridge of a roof; such as—Plain pan tile to cover the ridge; capped, so as to cover joint; rolled, or finished with a roll; or grooved to take a top, or a cresting, of a plain or ornamental character. IMBREX.

RIDGEWAY (.....), surveyor of work at Portsmouth; appointment of his successor 1560 R. Popynjaye; British Museum, *Add. MS.*, 5,752, fol. 315.

RIDGING; slate. "Thomas's slate ridging" in 1865 consisted of a slate on each side fixed by screws to the top of the ridge piece which was cut to a proper slope for them; the joint being covered by a cut roll fixed by a long screw through the top. "Thomas and Son's Bangor patent slate ridge" of 1871 consisted of the roll and both sides being virtually in one piece, by the sides being let into the underside of the roll; BUILDING NEWS *Journal*, xx, 489 and cut. "Williams's slate ridging" had the roll attached to one of the side slates, the other side slate being first screwed to the ridge piece. In "Davey's slate ridging" 1865, the side slates were united by iron plates under the angle, covered by a roll cut so as to cover the joint, and then secured in place by a screw from below. The three systems are shown in DAWBARN and Co., *Builder's Price List*, 4to., Manchester, 1865. Robinson's slate roll ribbing for ridges and hips, is also used, 1880.

RIDING HOUSE. (It. *cavallerizza;* Fr. *manège;* Ger. *reitbahn.*) A place for teaching riding or for exercising horses. Its length should be three times its breadth; the height according to the circumstances of each case; a gallery to admit of the inspection of the rides and also for spectators, at one or both ends of the riding house, but not projecting over the course; a store for leaping bars, posts, etc.; a clock; and gas fittings for fence and single-stick practice of an evening. A riding house will serve as a tennis court, flagged for the latter, and covered with straw, sawdust, or sand for the former; or a floor of blocks of wood might serve for both purposes. The old riding schools for cavalry at Maidstone, of timber, were 100 ft. by 40 ft.; that at Canterbury 120 ft. by 40 ft.; the more modern ones, as at Aldershot, are 180 ft. by 60 ft. A new school at Maidstone 1862 cost £2,693; *Papers of* CORPS OF ROYAL ENGINEERS, 8vo., Woolwich, new series, 1862, xi, 181 and plate. An open manège is required in addition to a riding school, 180 ft. long and 60 ft. wide, well drained and covered with fine gravel.

1789 Newcastle-on-Tyne, by D. Stephenson, 64 ft. by 76 ft. by 30 ft. to beam; CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 147 and plate.

1839-41 Windsor castle, Berkshire; 170 ft. by 52 ft. by 38 ft.; by H.

Ashton: with stabling £70,000. Illustrated London News, 1845. vi, 8. C. E. etc. J., v. 393. B. J., vi, 417; 431.

Cir. 1770 Wentworth, 130 ft. by 44 ft., by John Carr, very lofty and lighted by semicircular windows; Knightley, *Stable Arch.* fol., 1862.

1857 Duke of Wellington's, Knightsbridge high road, by P. Hardwick, 142 ft. by 61 ft. inside; Building News *Journal*, 1857, iii, 21.

Cir. 1640 Bolsover castle, for William Cavendish, first duke of Newcastle; shewn in his *Méthode et Invention*, etc., 42 pl., fol., Antwerp, 1657, and in English, *Treatise on the Art of Training and Managing Horses*, 2 vols., fol., Lond., 1743. It was the first in England, and has a handsome ceiling.

1623 he built a second one at Welbeck, 10 ft. wider. This is ascribed to John Smithson of Bolsover, by Walpole.

1732 The King's mews, Charing cross; by W. Kent; taken down 1830. Ackermann, *Microcosm*, 4to., 1808. ii, 162.

Cir. 1690 Mantua, great cortile of the palace, by F. Galli Bibiena.

S. Petersburg, 350 ft. by 90 Engl. ft. inside, by G. Quarenghi; pl. 14-18; and

Monaco for the king of Sardinia, 280 ft. by 65 ft. Engl. inside, by G. Quarenghi; in *Recueil*, fol., 1821; pl. 37-9; and Loudon, *Cottage, etc., Arch.*, 1833, p. 967.

Cir. 1750 Stupenigi, near Turin, by B. I. di Alfieri, of which his namesake the poet wrote "Volta Dottissima ed Audaciosissima".

S. Petersburg, pal. S. Michael; 536 ft. 8 ins. by 119 ft., by Brenna, *Disegni*, fol. (1800).

Modena, 181 ft. by about 50 ft.

1820-22 Munich, 300 ft. by 80 ft. Engl., by Leo von Klenze.

Brighton, 176 ft. by 58 ft. 6 in. by 34 ft. clear height; by W. Porden (200 ft. by 60). Brayley and Nash, *Illust.*, 1838, p. 17.

1817 Moscow, 550 ft. by 168 ft., (550 ft. by 150 ft.), (531 by 160), by 43 ft. high; the roof concealed by a flat boarded ceiling at 30 ft. high: by major-gen. Carbonier or Charbonnier from a plan by lieut.-gen. Betancourt, *Descr. de la salle de Moscou, etc.*, in Bruyère, *Etudes*. Cresy, *Encyc. of Civil Engineering*, p. 1335. Loudon, *Cottage, etc., Arch.*, 8vo., 1833, p. 971. The other design, 1800 ft. by 290 ft., usually given, was not executed. (See publications s. v. Moskva).

Wiesbaden; Reitschule des herzoglichen palais, 132 ft. by 60 ft. Ger.; Allgemeine Bauzeitung, 1842, pl. 438.

Leipzig; *exercierhaus*; 150 ft. by 48 ft. Sax. Herr Laves trussed girder to flattish roof. Allg. Bauz., 1840, pl. 358.

1830 Regensburg. In palace of prince Thurn and Taxis. Bas reliefs by Schwanthaler.

Bef. 1781 Darmstadt. The *exerzierhaus* or drill school; 500 ft. (or 319 ft.) by 150 ft., and 90 ft. high, now used as an arsenal; Rondelet, *L'Art de Bâtir*, fol., Paris, 1832, pl. 112.

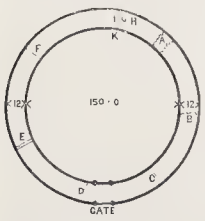
1719-25 Chantilly. Circular and open to the sky; 125 ft. diam., by Jean Aubert. Knightley, *Stable Arch.*, fol., London, 1862.

..... Riding Schools in France, designed by col. Ardant, are 73 ft. 4 in. wide; 56 ft. 6 in. to ridge of roof; Builder *Journal*, 1849, vii, 423, and plate.

1693 Salzburg; 110 paces long. Summer riding school; an amphitheatre hewn out of the rock of the Monchberg, having three galleries and 36 arcades.

Amphitheatre. Circus. Drill shed. Plank roof. Ride. Tennis court. Tilt yard.

RIDING RING. An adjunct to a horse-training establishment, consisting of a circle 160 or more feet diameter, formed of a post and horizontal rail-fence, 6 ft. high. A close boarded fence, 12 ft. high, for privacy, with the boards on the intrados of the circle, formed round the other fence at 12 ft. distance, provides a circular ride in which, at intervals, are placed various obstacles for horses to be trained to jump over, such as A, pond; B, bush-hedge; C, swinging gate; D, hurdles; E, stone walls with rounded tops; F, bar; G, stone retaining wall 3 ft. high with a corresponding change in the level of the ground, which at H may be 3 ft. lower than at I; and F to I being formed sloping. A gate (the outer one boarded as the fence) is provided to each fence, opening outwards from the ride. A horse is placed in the ride, trainers with whips are stationed in the inner circle, driving the horse unsaddled over the various jumps; after some weeks' practice the horse takes to the jumps readily, and then is practised further with a rider until he becomes fit for hunting or steeplechasing. To reduce the probability of accident, the fences on both sides of the ride must be made flush, and the square angles of posts and rails rounded off; the inner fence-rails must be arranged so as to allow the trainers to readily climb over into the ride, in case of a horse falling. R. R. R.



RIEDEL (Johann Gottlieb), also a painter who practised at Bayreuth 1722-91, had three sons Carl Christian 1764-96, Heinrich August, and Heinrich Carl, who all also practised in the same locality. 68

RIEDINGER (Georges), of Strasbourg, was architect to Jean de Schweickhard, elector archbishop of Mayence, during the first half of xvii cent. Schnéegans, *Maître des Œuvres*.

RIEDINGER D'ANDLAU (Jacques), master of the works to the city of Strasbourg, died in 1587.

RIDOLFI (Bartolomeo), *cir.* 1550, of Verona, also a stuccoist, worked very much in Poland and Italy. Ottaviano Ridolfi who practised at Venice is supposed to have been his son. 5. 68. 39.

RIDOTTO. (Fr. *redoute*). An edifice at Naples, adjoining the teatro reale di San Carlo, which comprised "ball rooms, eating rooms, and apartments for gaming; the last were constantly open night and day till the revolution, from which period they have been shut up"; Starke, *Travels in Europe*, 8vo., Paris, 1833, p. 292; 1839, p. 284.

RIEGATE and Rygate; see Reigate stone.

RIEGER (Cristiano), a Jesuit, published *Universæ Architecturæ Civilis Elementa*, 2 vols., 4to., Vienna, 1756; transl. into Spanish, *Elementos di toda la Arquitecta Civil*, 4to., Madrid, 1763. 66.

RIETI. (Anc. *Reate*). One of the principal towns of the ancient Sabini. A town in the kingdom of Italy, and situated on the river Velino. The cathedral dedicated to the assumption of the Virgin dates from xii cent., and restored 1456. A column in the lower church was a Roman milliarium. Angelotti, *Descr. di Rieti*, 1635. Maroni, *Commentarius*, 1763. Galotti, *Memorie di tre antiche chiese di R.*, 1765. Sperandio, *Sabina, sacra et profana, antica e moderna*, 1790. 14. 23. 50. 96.

RIEZ (Alebece of the Reii Apollinaris, Pliny: Albici Reiorum of Cæsar). A town in the department of the Basses Alpes, skirted by two torrents which unite to form the river Colostre, flowing thence into the Verdon. Four monolithic granite shafts with white marble Corinthian capitals of olive leaves and bases, 19 ft. high, formed the peristyle of a prostyle temple of the time of the Antonines. The round church of S. Maximus, the first bishop of Fréjus, has eight similar columns, and domed over, 16 ft. 6 in. in diameter; the columns 16 ft. 9 in. high; it was converted into a baptistery by S. Maximus; those at Fréjus and at Aix are copies of it: Texier and Pullan, *Byzantine Arch.*, fol., London, 1864, p. 98, pl. 10-1. Laborde, *Mons. de la France*, fol., Paris, 1816, i, pl. 46-7. The walls were rebuilt xii cent. The town was the see of a bishop from v cent.; the church is dedicated to the Virgin. 28. 50. 96.

RIFLE BUTT. A shield at the back of a range of rifle targets to receive stray shots. In a hilly country a rifle butt is readily obtained by escarping a hill, or using the face of an old stone quarry. In a flat country an earthen mound can be thrown up at the end of the rifle range; the ditch formed by the excavation in front of the butt, if drained, can be approached by a subway, and will afford a safe position for the marker's mantlets. The mound should be capped with a thick stack of faggots. The butt of the London Victoria rifle corps is of brick, plated with rough iron; brickwork unprotected with iron, is soon destroyed. A smooth floor of concrete or paving should be laid in front of the butt and targets, so that the lead of spent bullets may be gathered and remelted for future use. One 75 ft. wide and 25 ft. high, built of bricks faced with Staffordshire vitrified blue bricks in cement, cost £180; Building News *Journal*, 1860, vi, 702. Two estimates, Builder *Journal*, 1860, xviii, 176, 192. R. R. R.

RIGA; Rhiga (Liv.); and Riolin (Esth.) The capital of the government of Riga, province of Liefland or Livonia, in Russia.

situated on the river Dwina or Düna. The bridge of pontoons was replaced 1873 by a stone bridge. The walls were removed 1858. The town was greatly injured in the sieges of 1710, and of 1812 when the suburbs were burnt. The bishopric was founded with the town 1200. The Lutheran cathedral dedicated to S....., dating in the XIII and XIV cent. has cloisters. Of the thirteen (in 1847) other churches that of S. Peter's has a dome and a very lofty tower. The castle or residence of the governor was erected by, and until 1561 the residence of, the knights of the Teutonic order; it has been (1852) restored. A house with niches in its façade is said to be (1200) the first one erected. The Schwartzen häupter, *cir.* 1200; the ritter haus; the exchange (Florentine), having columns of red and grey Aberdeen granite; the merchant house; a very good theatre; the Catherinenhof, a bomb-proof warehouse 445 ft. long; the guildhalls, good modern edifices in the mediæval styles; are noticeable; and a granite column 1817, 23 ft. high, on which is a bronze figure of Victory, 9 ft. high. GRANVILLE, *S. Petersburg, etc.*, 8vo., London, 1835, i, 376-7. ILLUSTRATED LONDON NEWS, 1847, x, 309, gives a view. Forty houses and the new government building were stated to have been burnt Oct. 8, 1879. 14. 28. 50. 96.

RIGA TIMBER. The fir is a species of PINUS sylvestris, obtained from the forests in Polish and Russian Ukraine, on the banks of the rivers Briganskie, Desna, and Soeltz, thence into the Dneiper and by the Beresina canal into the Duna to the port. Almost all the fir timber in the log was formerly imported from Riga for beams, girders, and large joists, being very rigid and bending little under heavy weights. The longest logs, 36 ft. to 60 ft. long, averaging 40 ft., and 12½ ins. to 13 ins. square all the way and free from knots, were used for the navy. It is now ordinarily from 20 ft. to 45 ft. long and 11 ins. to 14 ins. square; classed at the port A to N; A being 24 ins. circumference, and N 72 ins. The "brach" at Riga is very rigid; that marked "crown" is perfect, and is selected for use by the Russian government. *Slab-edged* or the Dutch cut, is cut off square for a few inches at the angles, so 12 ins. might cut 10 ins. die square or the English cut. It is very regularly squared, very straight, clear of knots, straight in the grain, and very durable. Owing to its rigidity and freedom from knots, it is, however, more liable than some other timber to the defect of being rent and shaken at the heart, ascertained only by sawing the balk in half, for which reason the fir timber from other ports on the eastern coast of the Baltic is preferred by many.

Riga fir best for quality, Memel for size, Dantzic for strength, and Swedish for toughness; *Engineer's, etc., Pocket Book*, 1865, p. 128. Riga is lighter than Dantzic fir, as 541 to 582, to which the former is inferior in strength. *Growth of Riga Fir in France*, BUILDER *Journal*, 1865, xxiii, 464; and *Riga and Dutch Wainscot, idem*, 1846, iv, 364. Commissioners' *Report on Timber*, 1835; CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 405; PENNY MAGAZINE, 1843, xii, 19. LASLETT, *Timber and Timber Trees*, 8vo., Lond., 1875. BALTIC TIMBER. PINUS. RED TIMBER.

Wainscot was formerly much imported in logs, but lessened as mahogany and cedar were cheaper. It was a species of QUERCUS, formerly much used in churches, and almost exclusively in boat building, but for that purpose it is now superseded by Canadian oak. In 1847 it was again much imported and very superior in quality. The medullary rays are very numerous and more distinctly marked than in the Dantzic oak, otherwise it is much the same, and is chiefly used for furniture and ornamental work.

RIGALD TIMBER. Supposed to have been so called from Riga. 1371, xij rigald sarrandis dando pro pecia 1½d., 18d; SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, p. 8, 10, 12, etc., 351. "1418, Rygholtz for moldez", and "righoltez" may be the same word; BROWNE, *York Cath.*, p. 217, 219. RAGOLD. MOULD, p. 135. WAINSCOT.

RIGEL (RAPHAEL), carried out 1820 C. von Moreau's Greek design for the *ausschussversammlungs saal*, 50 ft. by 27 ft. by 19 ft. (Pruss.) high, in the Austrian national bank at Vienna. 26.

RIGHETTO (AGOSTINO), *proto* 1555 of the duomo at Padua "che ebbe il carico di modellarla"; ZAMBONI, *Brescia*, fol., Bres., 1778, p. 67.

RIGHI (VENANZIO), of Perugia (?), born 1714, died 1781; was also a *pittore di quadratura;* MANCINI, *Istruzione—di Città di Castello*, 8vo., Perugia, 1832, ii, 219-25.

RIGIDITY or STIFFNESS. The property which a solid body possesses of resisting forces tending to change its figure; RANKINE, *Manual of Civil Engineering*, 8vo., London, 1864. BELL, *On the Stresses of Rigid Arches, etc.*, in INST. OF CIVIL ENGINEERS, *Proceed.*, 1871, xxxi, 145-8; BUILDING NEWS *Journal*, xxi, 427.

RIGUZZI (ARDUINS), submitted 1514 a Gothic model of a design for completing the façade of S. Petronio at Bologna; R.I.B.A., *Sessional Papers*, 1870-71, p. 44.

RILE (GERHARD VON), commonly called meister Gerhard; see Gerhard von KETTWIG.

RILIEVO. It. for RELIEF.

RIMACHI (HUALLPA), inca, erected about the middle of XIII cent. the fortress of Sacsahuaman, near CUZCO, in Peru; having under him three engineers named Maricanchi inca, Acahuana inca, and Calla Cunchuy, according to MILIZIA, *Lives*. Why such a defence was erected as against bows and arrows is a mystery. PRESCOTT, *Peru*, 8vo., London, 1853, i, 15; SQUIER, *Incidents of Travel*, 8vo., 1877; SQUIER, *Geog. and Arch. of Peru*, 8vo., 1780. 3. 68. 69. 116.

RIMER. A tool made of various sizes, pyramidal in shape, with a vertical angle of about 3½ degrees, the cross section of which is either polygonal or semicircular, according to its use in enlarging holes in iron or in brass. BIT.

RIMINO or RIMINI. (Ariminum of the Umbrians.) A town in the province of Forli, in the kingdom of Italy, and situated between the rivers Marecchia and Ousa or Ausa. The bridge, 220 ft. long and 24 ft. wide, has five semi-arches varying from 22 ft. to 30 ft. span, with piers 12 ft. thick, and 4 ft. 2½ ins. on the skew, is still in good preservation, though one of the arches has been patched if not rebuilt. It is of white Istrian limestone, and was begun A.D. 13-14 by emperor Augustus, and completed by Tiberius (14-37). The triumphal arch, or porta Romana of travertine, was erected by Augustus who repaired the roads. At the convent of the Capuccini are some ruins said to belong to an amphitheatre erected by Publius Sempronius. The town walls date from the time of pope Paul V (1605-21); the brick castle 1445 was for S. P. Malatesta. Among the buildings are: the palazzo del comune; palazzo Ruffi now Cisterini; and the fish market, given in LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 82; a library founded 1617 of 30,000 volumes; a bronze statue of pope Paul V (after 1621); and a handsome fountain, deserve attention. The bishopric was founded 260. The cathedral dedicated to S. Francesco erected XIV cent., was remodelled and cased inside and outside 1447-50 by L. B. Alberti for S. P. Malatesta, as the mausoleum of the family; it is considered his masterpiece; the marbles of the Roman harbour, and also some from Ravenna, were used in the works. *Tempio di Malatesta in Rimini*, fol., Fulg., 1794; GALLY KNIGHT, *Eccles. Arch.*, fol., London, 1842-44, ii. S. Giuliano; S. Girolamo; and the small brick church of Sta. Maria in Acumine, 1373, very highly wrought and having three gables on the sides, are deserving of notice.

ADIMARI, *Sito Riminense*, 2 vols., 4to., Brescia, 1616. BLAEU, *Nov. Theatrum Italiæ*, fol., Amst., 1705. *Del Porto di Rimini; Lettera di un Riminese ad un' amico di Roma; coll' app.*, pl., 4to., Roma, 1768. *Raccolta di antiche inscrizioni che si ritrovano nella città di R. e nel suo territorio.* TEMANZA, *Le Antichità di R.*, 9 pl., fol., Ven., 1741. *Inscriptions* in MURATORI, p. 2,006; and ORELLI, p. 604. NARDI, *Descr. Antiq. Arch.—dell' arco, ponte, e tempio*, 17 pl., fol., R., 1813. BRIGHENTI, *Illustrazione dell' arco di Aug.*, fol., Rimini, 1825. FREEMAN, *Historic Sketches*, 8vo., London, 1876, p. 135-45. WOODS, *Letters*, 1828, ii, 134-6. EUSTACE, *Classical Tour*, i, 281-2. RAMPOLDI, *Diz. Corogr.*, iii, 594. 14. 15. 23. 25. 28. 50.

RIM LOCK. The old form of lock fastened to the rail on

the inner face of a door. An "iron rim lock" is one whose box or case is made of iron; the sizes are from 4 to 8 ins.: a larger one for an entrance door is called an "iron rim drawback lock", when the bolt can be drawn back by a metal knob inside the door; from the outside such a lock can generally only be opened with a key. For better purposes, as living rooms, the case was made of brass; this last is now superseded by the MORTISE LOCK. A brass or gun metal rounded case rim lock, as used for cabins and naval fittings, is a useful lock for thin doors and positions exposed to damp, work near the sea coast, etc. FURNITURE. SPINDLE. STOCK LOCK.

RIMUALDUS; see PISANO (R.), *cir.* 1118 (?).

RINALDI; the family of; see RAINALDI.

RINALDI (ANTONIO), of Rome, was called to S. Petersburg by empress Catherine II (1762-96) for whom he modernised the palace erected by Menzikoff at Oranienburg; designed the Strelna palace, near S. Petersburg, rebuilt after the fire of *cir.* 1730-40, restored 1800; 1768 commenced (or by Wüst and Stengel) the church to S. Isaac of Dalmatia, finished 1802 by V. Brenna or by Hegner; 1769 designed the belfry 290 ft. high to the church of Sergius Radonejski, one of the ten in the monastery of S. Sergius at Troitza, near Moscow, the bell in the second tier of which weighs nearly 65 tons; 1770-85 the *Marble* palace at S. Petersburg (not by Grimaldi as sometimes printed), rebuilt 1847; designed in the park at Zarsko-selo after 1771 the triumphal arch erected to count Gregory Orlov (SVIGNINE, *S. Petersbourg*, 4to., S. Pet., 1816-18, i, pt. 2, p. 161); for whom he 1771 designed the palace at Gatschina near the city; and at Moscow designed 1774 the large palace of the tzars, finished by Camporesi; the two Corinthian façades by Guarini. He died 1780. 68.

RINALDI (OTTAVIANO), of Rome, was employed at the church of Sta. Maria presso S. Celso, at Milan. MILAN, *Raccolta, etc.*, 4to., 1820, p. 45.

RIND to a joist. The Scotch term for a fillet.

RIND, "or bark of an Ionic capital", as explained further in BUILDERS' DICT., 8vo., 1734, s. v. Capital, sig. N 3.

RING. A circular belt; also called ANNULET; BANDALET; LIST; CINCTURE; FILLET; and STRING.

RING (Fr. *frette*), or ferule, at the top of a pile to prevent the head splitting to pieces by the blows of the "monkey" or weight falling on it. KNOCKER. 25.

RINGBOLT. A screwed bolt with a nut at one end and a loose ring at the other, used for tying horses in stables, or securing ropes to, as in ships' decks and bulwarks. R. R. R.

RINGHIERA, poggiuolo, pergola. The Italian names for a projecting or cantilevered balcony in front of an edifice, from which the citizens were addressed. It was the popular *parlera* of the loggia degli Osii, at Milan, begun 1316, who defrayed much of the expense of it, and from which balcony the assent of the citizens was asked by the *podestà* to acts of government, etc., and sentences were proclaimed. The tribune in the piazza della Erbe at Verona, is a small open one; in 1846 it occupied the place of another wherein the capitano del popolo was invested with insignia after service at the duomo, and from this place addressed the people, till 1301 or 1311; later, proclamations were made, and sentences of death were pronounced from it, and debtors submitted to humiliating punishments. Other examples may be seen, as the broletto 1215 at Como; at the *broglio* or townhall at Bergamo; the *embroglio* at Venice, under the palazzo ducale; at the palazzo della loggia at Brescia, *Illustrations*, 1861, pt. ii; and at the palazzo del commune at Piacenza, 1281. LOGGIA. 28.

RINK. A surface whereon persons can amuse themselves by skating during all seasons. It is the successor of the Glaciarium, one of which was opened in 1840. Such buildings were most numerous 1875-77; there were at least seventeen open in 1876 in London; BUILDER and BUILDING NEWS *Journals*. The floors at Addison road; King's road, Chelsea; Oxford circus; Ealing; and Harrow, were of a material made by messrs. Bazley White and brothers, for messrs. Green and King, the inventors. The floors at Prince's, and in the Clapham road (18,000 sq. ft.), were made of marble. Plimpton invented a floor of pitch pine in narrow widths braced together underneath, so as to expand or contract without warping; it could be laid on joists; and was removable at pleasure; BUILDER *Journal*, 1875, p. 242. In 1879, a floor of artificial ice was made; and one of real ice, 37 ft. by 24 ft., was opened in King's Road, Chelsea.

RIO (FRANCISCO DEL) was one of the workmen that R. Gil de Hontañon employed to direct the construction of his works, and he refers to Rio in his will (i, 319) as valuer of the undertakings that Gil left unfinished. He 1570 designed the body of the church and the tower of the parish church of the Magdalena at Valladolid, and 11th October 1570 contracted to erect them for 6,400 ducats; the document is still kept in the archives of the house of the marquis of Revilla. He 1575 contracted to execute the chapel of Alonzo de Vega the younger, in the church of S. Julian at Valladolid; and 15th October 1575 he gave power to another Francisco del Rio, perhaps his son, living in the villa of Castro, to compel the inhabitants of Pinel de Arriba, to undertake to restore the tower and chapel of that church, that were falling. Rio constructed many churches in Castella la vieja; and although apparently a mere executor thereof, he was a very intelligent designer. He 1576 was "maestro destajista" at the Escurial. 66.

RIO DE JANEIRO, or S. SEBASTIÃO. The capital since 1808 of Brazil, and the largest and best town in South America; it was founded by the Portuguese after 1567. The bay of Rio forms a very fine harbour accessible to the largest vessels; the graving docks, cut out of the granite rock, were designed and constructed 1861 by Henry Law, C.E., of London. The houses of the new town erected chiefly after the arrival of the royal family from Portugal in 1808 are generally of granite. An aqueduct 1740, from mount Corcovado, consists of a double series of forty-two arches with a conduit over in which is the channel 9 ins. wide and 9½ ins. deep; it supplies the public taps only; BUILDER *Journal*, 1847, v, 505; EWBANK illustrates it. Extensive waterworks have recently been constructed by Mr. Gabrielli to bring the water of the river S. Anna, a distance of about 40 miles, through pipes of cast iron one metre in diameter. The drainage was planned by messrs. Gotto and Beesley of London, and has recently been extended; B. *J.*, 1862, xx, 140; 1879, xxxvii, 294; Numerous quarries of gneiss and granite are opened near the city. There are fifty-one churches having sumptuously decorated interiors; the exteriors with some exceptions are plain; some of the façades are of marble obtained from Portugal; B. *J.*, 1851, ix, 263. The R. C. cathedral is dedicated to S. Sebastian. The octagonal church of Nossa Senora da Gloria is one of the most recent. São. Francisco de Paulo (Ionic), before 1820, has two round towers, and a hospice attached: that of the Cross; and de Candellaria, one of the largest, having a majestic façade, and two towers the loftiest in Brazil. The monastery of São Bento is massive, with heavily-barred windows, and so richly decorated within that it is nearly all gilt; that of S. Antonio, founded 1619, is a gorgeous edifice, with two immense chapels and a vast cloister. The nunnery of Sta. Teresa is plain; and has the only set of chimes in the town.

The imperial state palace, called the "Paço", used only for government offices and levees, a plain brick edifice, occupies two sides of Palace square which is 450 ft. by 240 ft.; it was formed by uniting the palace of the viceroys on the west side with the Carmelite monastery (the church of which is richly gilt); the municipal camera, the senate house, and the mint, in the campo de S. Santa, which has recently been laid out as a public garden; the imperial hospital of dom Pedro II, a fine edifice; college of S. José; the exchange 1820 in a good style; the treasury; custom house, a new, extensive and fine edifice; national library of over 80,000 volumes and many valuable MSS.; academy of fine arts opened 15 Nov. 1826; a very fine large market; the misericordia or public hospital 1841 also good:

comprise the noticeable edifices, with the new opera house (one of four theatres in 1850) which was 1859 competed for; the 1st prize gained by Gustave Waenheldt of Rio, is supposed to have been carried out; 2nd, by Green and de Ville of London (view and concert room in B. *J.*, xvii, 680, 695-6); and 3rd, by S. Sloan or Swan of Philadelphia; Civil Engineer, etc., *Journal*, xx, 346; Building News *Journal*, v, 872.

The railway to Petropolis, about thirty miles distant, the mountain and summer residence of the court and upper classes, was opened 6 Sept. 1853. The palace is large and void of beauty; B. *J.*, 1872, xxx, 1000. At São Christovão, the usual country residence of the emperor, about three miles from Rio, is an exact copy of the park entrance at Sion House, Isleworth, sent out by the late duke (1799) of Northumberland, as a present to John V, king of Portugal. Gentleman's Magazine, 1820, pt. 2, p. 197, 305. Gore Ouseley, *Desc. of Views in S. America*, thirteen views of Rio and its vicinity, 8vo. and fol., London, 1852. Debret, *Voyage pitt. au Brésil*, fol., Paris, 1834-9, gives a map at end of vol. ii, and devotes vol. iii to Rio; pl. 41 is a plan and section of the academy; pl. 42 of two small houses; pl. 43 of a larger one; and other plates of public edifices. Hadfield, *Brazil, etc.*, 8vo., London, 1854. Elwes, *Sketcher's Tour Round the World*, 8vo., 1854. Kidder, *Sketches of Residence and Travels in B.*, 8vo., 1849. Ewbank, *Life in Brazil*, 8vo., New York, 1856. Henderson, *History of Brazil.* Kidder and Fletcher, *Brazil and the Brazilians*, 8vo., 1857. Walsh, *Notices of B.*, 2 vols., 8vo., 1830. Scully, *B., its Provinces and Chief Cities, and Manners, etc.*, 12mo., 1866. Mansfield, (edited by C. Kingsley), *Paraguay, Brazil*, 8vo., 1856. Christie, *Notes on Brazilian Questions*, 8vo., 1865. Geological Transactions, 2nd ser., ii, *On the Geology of Rio.* Martin, *Palms of B.*, 1817-20. H. L. 14. 50. 96.

RIOSECO (Pedro de); see Hernandez (C).

RIOU (Stephen), served 1741 as a cavalry captain in Flanders. He published *The Elements of Fortification; transl. and collected from the works of the most celebrated authors*, vol. i only, 4to., London, 1746; *Principles for the architecture of Stone Bridges*, 8vo., 1760; and *The Grecian Orders of Arch. delineated, etc., from the Antiq. of Athens; also, the Parallels of the Orders of Palladio, Scamozzi, and Vignola:* etc., fol., 1768. He was resident in Canterbury in Feb. 1769 when he competed for the royal exchange at Dublin; Builder *Journal*, 1869, xxvii, 781. He died 12 March 1780, and was buried on north side of Marylebone church yard. His sons were col. Philip, and capt. Edward Riou. Gentleman's Magazine, l, 153.

RIPATRANSONE. A walled town in the delegation of Fermo, in the kingdom of Italy. The cathedral dedicated to S. Gregorio, was erected soon after 1599 by G. Guerra with half its façade; the cupola about 1770 was added by F. Rossetti; and the front completed about 1840 upon another design; Gualandi, *Memorie*, 8vo., Bol., 1844, iv, 123-5; and the campanile in 1850. The palazzo comunale built 1198, was partly demolished 1851. Calindri, *Saggio Stat. dello Stato Pont.* 28. 50. 96.

RIPE. A tool used in sculpture. 4.

RIPLEY (Thomas), "born in Yorkshire; from a carpenter that kept a shop and also a coffee house in Wood Street, Cheapside, by marrying a servant of a minister (Sir R. Walpole), obtained a seat at the board of works"; Sir J. Hawkins, *Life of Johnson*, 1st edit., 1787, p. 375; Cunningham, *Handbook to London*, 8vo., London, 1850, p. 558. Ripley, 14 March 1705 was admitted to the freedom of the Carpenters' company; in 1718 was clerk of the works at the king's mews; Aug. 10, 1721, was appointed chief carpenter to all H. M. works and buildings in England, vice G. Gibbons. 1726, Apr. 30 or May 8 appointed comptroller, vice Sir J. Vanbrugh; 1727, Sept. 9 appointed comptroller general; and 1737, June or Nov. also keeper of H. M. private roads, gates, and bridges, and conductor in his royal progresses. He was succeeded by H. Flitcroft. He obtained 1742 a grant of arms from Heralds' college; and June 5, 1744, was fined for the office of sheriff of London and Middlesex.

His first design appears to be 1718 for rebuilding the custom house after the fire of 1715, and it was also burnt 12 Feb. 1814; a print dated 1722 is in the Crowle Pennant in the British Museum, x, 10. 24 May 1722-35 he carried out C. Campbell's design for Houghton hall, Norfolk, for Sir R. Walpole; but the domes and parts above the cornice, and certain alterations to the portico and offices, are probably to be attributed to Ripley; W. Kent designed the ornaments and chimney pieces; Ripley, Ware, and Kent, *Houghton Hall*, 35 pl., fol., London, 1735, 1755-60; Neale, *Seats, etc.*, 4to., London, 1822, ser. 1, iii; Norfolk Tour, 8vo., London, 1829, i, 516-41: *Ædes Walpolianæ*, 4to., 1752: the north wing was burnt 1789. 1724-30 he designed Wolterton house, Norfolk, for lord Walpole, "one of the best houses of the size in England"; 1727-1741 are the dates over the eastern doorway; Neale, *Seats*, iii; Norfolk Tour, i, 217. 1724-26 the Admiralty, Whitehall; Dodsley, *London and its Environs described*, 8vo., London, 1761; the screen by R. Adam. Being appointed Sept. 2 or Nov. 12, 1729, surveyor to Greenwich hospital vice C. Campbell at £200 salary, he designed the interior portion and roof of the first chapel: it was burnt 2 Jan. 1779 and rebuilt by J. Stuart. In 1739 he assisted W. Kent in the designs for the buildings on east side of the old Margaret street, Westminster (Kent, p. 13); and advised taking down the vaulting of the chapter house at Westminster abbey in 1740 in consequence of its defective state; Builder *Journal*, 1859, xvii, 723-4. He died 10 Feb. 1758, at his official residence at Hampton Court, and was buried in Hampton church, where is a slab in the floor. His portrait by Gardiner is at Wolterton; and the family have one by J. Highmore. He left three sons: a grandson Richard was 1779 a pupil of Sir W. Chambers. Ripley is three times referred to in Pope's essays. His signature, with those of W. Kent and H. Joynes, is attached to a warrant of king George II, 25 Nov. 1727, in British Museum, *Add. MS.*, 20,101, fol. 25; 41: and a plan of queen Mary's court at Greenwich hospital, dated 6 March 1734, having the signatures of Ripley and Richard Biggs, is in Sir J. Soane's museum, among Hawksmore's drawings. Gentleman's Magazine, vii, 515, 702; viii, 166, 222; xii, 274; xiv, 333; and xxviii, 94, death. Walpole, *Anecdotes.* Builder *Journal*, 1851, ix, 2-3, wherein G. R. Corner names the then representatives of the family, of whom many notices are extant; and *idem*, 1862, xx, 563, by A. Cunningham.

RIPON formerly Rippon. A city in the west riding of Yorkshire, situated on the river Ure, crossed by a stone bridge of twelve arches, repaired in 1545 (Repair). The bishopric was created 5 Oct. 1836. The cathedral (collegiate 2 James I) dedicated to SS. Peter and Wilfred, affords good specimens of each period of mediæval architecture (Building News *Journal*, 1872, xxiii, 178). A Saxon or early Norman crypt; Norman chapter house, sacristy and crypt under (or confession, B. N. *J.*, 1869, xvi, 473) 1069-1100; Lady chapel over 1482, now the library; Early English west front 43 ft. by 103 ft. and towers, central tower (portions fell 1459), transepts with part of the choir and ailes, date 1154-1255; two eastern bays of the choir 1288-1300 (B. N. *J.*, 1877, xxxii, 618); Early Decorated east window 25 ft. wide and 51 ft. high; choir ailes doubled in length date 1317-40; south and east sides of central tower after their fall in 1459, east side of the south transept also rebuilt, choir screen, two bays south side of choir; and the nave, all 1460-1520. The older portion of the edifice 1154-81 and west front are built of Pateley bridge grit stone, or from near Brimham Crags; the later works are of magnesian limestone. The edifice was restored from 1861 by G. G. Scott; Builder *Journal*, xix, 716; B. N. *J.*, 1869, xvi, 122; and 1872, xxiii, 331; reopened Oct. 1872, B. *J.*, xxx, 861. Trinity church dates 1826; and the R. C. church 1862 is by — Hanson, B. *J.*, xx, 356.

The town hall 1801 has a handsome suite of rooms; the public rooms 1834 cost £2,500; the York and Ripon diocesan female training schools, 1860, by J. B. and W. Atkinson, £5,574, B. *J.*, xviii, 696; free grammar school founded 1546; among

the almshouses is new S. John's 1877, by R. U. Brodrick of Ripon; and among the hospitals is Jephson's 1878-9 by J. W. Bishop of Ripon. Fountains abbey is distant about three miles. GENT, *Antient, etc., History*, 4to., York, 1733. ALLEN, *Yorkshire*, 3 vols., 4to., London, 1828-31. WHITE, *History and Gazetteer of the West Riding;* WALCOTT, *Guides to Minsters.* WINKLES, *Cathedrals*, 1836-38. WALBRAN, *Guide to Ripon*, etc., 8vo., Ripon, 1856, 6th edit.; and *Pictorial Pocket Guide*, 12mo., 1847, 2nd edit., and in Papers to ROYAL ARCHÆOLOGICAL INSTITUTE, 1874. KING, *Handbook to Cathedrals*, 8vo., London (Murray), 1869. *The History of Ripon*, etc., 12mo., Ripon, 1801; 1806. *Tourists' Companion*, 12mo., 1817; 5th edit., 1828. *Tourists' Guide*, 12mo., 1837; 1838. *History of Ripon*, 12mo., 1839. WILSON, *Copy of all the Inscriptions*, etc., 12mo., Ripon, 1847. BRUCE, *Sepulchri Riponensis*, 1850. *Illustrations*, pl. 199. 14. 50.

RIPPER. A tool used for forcing up floor boards. A ZAX is used by slaters in stripping or repairing slated roofs.

RIPPING. The tiler's term for stripping or taking the tiles off a roof when it requires much repairing. LANGLEY, *London Prices*, 8vo., London, 1747; 1750, p. 329.

RIPPING CHISEL. A blunt chisel used by carpenters for forcing apart two pieces of wood secured together; MOXON, *Mechanick Exercises*, (House carpentry), 4to., London, 1694, p. 120-1. Bricklayers also use a ripping chisel in forming holes.

RISER (Fr. *contre marche*, 5). The vertical piece between the two treads of a stair. The tread should be wide enough for the foot to be planted firmly on it in descending; as one that may not be difficult to mount may be dangerous to come down. No tread should be less than 10 ins. and the riser 6½ ins.; 12 in. treads and a 5½ in. riser are considered a good standard. For every inch added to the tread a deduction of half an inch should be made from the rise. Each riser should rest on the tread below it. STAIRS.

RISING, or SKEW BUTT, HINGE, or RISING JOINT HINGE. A contrivance in which the pivot, having on it a short portion of a spiral thread, and the part to which the door is fixed having a correspondent mass, the door on opening rises, and thus clears the carpet or mat on a floor. There are also iron "rising spring hinges", made by Redmund. Such a hinge also gives the door an inclination to close of itself. A door can also be made to rise over a carpet by using a gooseneck for the lower hinge; or if hung with ordinary butts, by projecting the knuckle of the lower butt further from the face of the door than the upper butt, thus the door is hung as a trapezoid.

RISTORO (FRA); see CAMPI (FRA RISTORO DA), and fra Sisto da Firenze. Besides the works therein mentioned, the church of S. Domenico at Pistoja is said to have been begun 1280 after their designs, and of P. dell' Ancisa till 1284; J. Talenti with others about 1330 erected the campanile after the designs left by these two brethren: who also designed that of S. Domenico at Prato, begun 1281, conducted to 1300 by fra P. Pilastri, and 1300-10 by fra Mazetto: the monastery and church were not completed in 1322. GRANDJEAN ET FAMIN, *Architecture Toscane*, fol., Paris, 1875, new edit., pl. 84. MARCHESE, *Lives*, 8vo., Dublin, 1852, i, 9-29; 33; 35; 104; citing FINESCHI, *Memorie Istoriche*, Flor., 1780, and other writers. WEBB, *Continental Ecclesiology*, 8vo., London, 1848, p. 324; 525.

RITTER (JOSEPH), a carpenter of Lucerne, built 1764 a covered or hanging bridge of one arch, 166 ft. span, polygonal, over the river Kander in canton Berne; KRAFFT, *Carpenterie*, pt. 3, p. 7, pl. 27; WARR, *Dynamics*, 8vo., 1851, p. 171; another, 1786 of one arch 148 ft. span, polygonal, over the river Reuss, in canton Berne; and a third, 1794, one arch covered, 157 ft. 6 in., rib, at Millengen over the river Reuss.

RITTER (JOSEPH), baumeister to prince Liechtenstein, remodelled 1770 the large parish church (founded 1712) zu den heiligen vierzehn Nothhelfern at Liechtenthal, near Vienna. 26.

RIVA (ANTON), of Landshut, at the end of XVII cent. added the cupola to the cathedral at Regensburg; it was removed about 1833-38.

RIVALZ and RIVALS (JEAN PIERRE)) engénieur en chef de la province de S. Jean, designed the hôtel de ville at Toulouse, which he also decorated with paintings. His son and pupil Antoine, born 1665 or 1667, a celebrated painter, died 1735 aged 68 years. TOULOUSE, *Guide des Etrangers*, 16mo., Toul., 1844, p. 52; 77. 5.

RIVARD (MARC), prior 1679 of the abbey church of S. Wandrille, designed many works for its restoration after the fall of the central tower in 1631; and in great part renewed the stained glass windows. LANGLOIS, *Essai hist.*

RIVAS (DAMIAN), executed works at BARCELONA (p. 24).

RIVERO RADI (G. DI); see RIBERO RADA (J. DE).

RIVER WORK. See BRIDGE; and LIGHTHOUSE. LE CREULX, *Recherches sur la formation et l'existence des Ruisseaux, Rivières, et Torrens, etc.*, 4to., Paris, 1804. FABRE, *Essai sur la théorie des Torrens et des Rivières*, etc., 4to., Paris, 1797. ROBERTSON, *On the fall of Water under Bridges;* in PHILOSOPHICAL TRANSACTIONS, 1758, p. 492. JOHNSTONE, *Theory and Practice of Draining Land; also on Sea, River, and Lake Embankments, etc.*, 25 pl., 4to., London, 1834. STEVENSON, *Canal and River Engineering*, 2nd edit. 8vo. Edinb., 1872. PLUMBE, *Requirements of River side construction*, river, wharf, and inland walls, and floor, in BUILDING NEWS *Journal*, 1869, xvi, 271.

RIVET (.....), was 1700 admitted a member of the royal academy of architecture at Paris, and died 1720.

RIVET. It is described in 1736 as "a little kind of iron peg headed like a clout nail, and sometimes quite flat, and made of tough metal, to fasten hinges on tables and other things that require strength, which by a joiner's flat edged hammer is so clenched upon the hinge, that another head in a manner is thereby made on that side". 4.

The "manner of rivetting a pin into a hole", is explained in MOXON, *Mechanick Exercises*, (Smithing), 4to., London (1677-8), 1693, 2nd edit., p. 24-5, thus, "To batter the edges of a shank over a plate or other iron the shank is let into, so as the plate or other iron may be clinched close, and fixed between the battering at the end of the shank and the shoulder."

The modern 'rivet' (Fr. *rivet*) is a small pin made of the most tough and ductile iron, having a good and sufficient 'head' and 'snap'. It may be bent double whilst cold without showing any signs of fracture, and the head when hot should stand being hammered down to less than ⅛ in. in thickness without cracking at the edge. It should also stand having a punch of nearly its own diameter driven right through the shank of the rivet when hot without cracking the iron round the hole. Lord Ward's, and Galloway's, rivets are said to stand these tests satisfactorily. The texture of the rivet, if nicked and bent gradually, should be fine, fibrous, and silky; if nicked all round and broken by a smart blow, the fracture should exhibit a fine, even, crystalline appearance. To make a countersunk point requires an additional length of rivet over and above that necessitated by the thickness of the plates through which it passes, equivalent to one diameter, and for a snap point about one and a quarter diameter of the rivet; BRITISH ARCHITECT *Journal*, 22nd June, 1877. "In the manufacture of wrought iron girders, if by accident an indifferent piece of rivet iron is used, in the cooling of the rivet the head will fly off; GRISSELL, in BUILDER *Journal*, 1851, ix, 359. *Experiments* on the strength of rivets are given in the description of the Britannia and Conway tubular bridges. Other experiments gave the average breaking weight per square inch of sectional area as 35.10 tons for a chain joint and 18.82 tons for a lap joint; by DOYNE, at INST. OF CIVIL ENGINEERS, 1849-50, *Proceedings*, p. 352-3; and BUILDER *Journal*, 1850, viii, 214. It is essential that the rivet should tightly fit its hole. The 'clenching' is effected while the rivet is red hot. Some engineers recommend that its diameter should be twice the thickness of the plate for plates less than half an inch thick; and for half an inch and upwards, about once and a half the thickness of the plate. The 'pitch' (the distance from centre to centre of the rivet), ranges about 3 ins. to 4 ins. in a cover

plate, or twice and a half the diameter in boiler work. The pitch and diameter should be marked on the drawings, and the exact relative positions be accurately ascertained by full size drawings; BRITISH ARCHITECT *Journal*, 22 June 1877. The common practice of boiler makers using 2 in. pitch and $\frac{3}{4}$ rivets, whether the plates be $\frac{5}{8}$ in., $\frac{7}{16}$ in., or $\frac{1}{2}$ in., cannot be too much condemned, as experiments decide that this is not the correct method of construction: for $\frac{1}{2}$ in. plates and $\frac{3}{4}$ in. rivets, the pitch should be 1·6334 ins. as explained by BALDWIN, *On Riveted Joints*, read at the SOCIETY OF ENGINEERS, 1866, and in C. E., *etc., Journal*, xxix, 313. BENDER, *Proportion of Pins used in Bridges*, 12mo., New York, 1873. NAIL.

Machines are given in CIVIL ENGINEER, *Journal, etc.*, 1841, iv, 56, by Stocker of Birmingham, for nail, pin, and rivet making; *idem*, 1843, vi, 115, Fairbairn's improved patent rivet machine, with illust.; and *idem*, 1844, vii, 366, modified by Schneider brothers and co., of Creusot, France. BUCHANAN, *Millwork*, 8vo. and fol., London, 1841-2, pl. 54. ILLUSTRATED LONDON NEWS, 1851, xix, 130. BUILDER *Journal*, 1861, xix, 859. SAWYER, *On Shearing, Punching, Riveting, and Forging, Machinery*, in INST. OF CIVIL ENGINEERS, *Proceedings*, 26 January 1858, p. 173-5. GRANTHAM, *Iron Ship Building*, 4to., 1868.

RIVETED STRUCTURE. The effect of riveting wrought-iron plates together is often forgotten in calculating their resistance; their strength to resist a downward pressure being materially injured by the execution of the riveting; but it appears that the extent of this injurious action is to a great extent modified by the manner in which the holes are made; *à priori*, it would seem that the strength of the plate with the rivet-holes *bored*, would be greater than that with rivet-holes *punched*; not only because the iron is not subjected to such violent mechanical action, but that the holes would agree better with the rivets. The practice of engineers varies on this point. In the wrought-iron road-bridges of the Charing Cross railway, the holes were punched; in the bridge over the river they were drilled. Most firms in 1865 punched the holes; PARKES, paper read before the SOCIETY OF ENGINEERS, 1865. It would appear from Fairbairn's experiments that the strength of the plates ought to be calculated as follows:

Calling the strength of the plate in its normal state at - - - - - - - - - 100	100	In "Iron manufacture".
That with a double riveted joint in zigzag form, about - - - - - - - - - 70	68	
That with a single riveted joint, about - - - 56	46	

The mean breaking weight of plate-iron being, according to FAIRBAIRN, about twenty tons on the square inch; BUILDER *Journal*, 1862, xx, 438: and paper read at the Society of Arts, Nov. 1864. It is considered necessary to make the tensile strength of the plate between the rivet-holes equal to the shearing strength of the rivets; or otherwise, in shearing stress the weakest of the two resistances would yield, and would become the measure of strength. BARTON, *Wrought iron beams*, INST. OF CIVIL ENGINEERS, *Proceedings*, April 1855, p. 450. *Riveted joints*, ARTIZAN *Journal*, xvi, 29. *Plate Girders*, BUILDING NEWS *Journal*, 1867, xiv, 472 and 519; 1874, xxvii, 548. ARMSTRONG, *Modern Practice of Boiler Engineering*, 12mo., revised, 1856, and other works; and B. N. J., 1869, xvi, 20. ANNALES DE LA CONSTRUCTION, fol., Paris, 1855, i, pl. 3-4. BEARDMORE, *Tables*, cvii. WARR, *Dynamics, etc.*, 8vo., 1851, p. 195.

"Chain riveting" is a term given by FAIRBAIRN to his system adopted in order to lose as small a portion as possible of the power of the plates; thus, where the plates are double, the joints of one series are placed at the middle of the other series, and each joint has a covering plate; by riveting the three together, the joints are considered to be nearly, if not quite, as strong as the solid plate. GIRDER. PLATE BEAM.

RIVETT (NICHOLAS); an error for REVETT (N.)

RIZZO; see RICCIO (ANDREA and ANTONIO.)

RO (GABRIELE DA); see RHO (G. DA).

ROACH BED. One of the three chief varieties in use of Portland stone. It is usually from 2 ft. to 4 ft. thick; and where it replaces one of the beds of freestone, it reaches to 10 ft. PORTLAND STONE.

ROAD. (Lat., *via;* Ital., *via, strada, cammino largo;* Span., *camino, viage;* Fr., *chemin, route, chaussée;* Ger., *chaussée; landstrasse.*) A way of overland communication from place to place, with a hard surface for the traffic of pedestrians, animals, and carriages. The essentials in a road are perfect drainage, an unyielding substratum, easy gradients and a smooth surface not readily worn away. The formation in a boggy district is with faggots; in a clay district with burnt ballast; where available, broken chalk is preferred. In a mountainous district, roads are generally made in a contour line so as to reduce the gradients, and carried along the edge of a cliff as an escarpment or shelf, the rock above, when necessary, being blasted away with gunpowder; and tunnelled in parts to avoid awkward bends. The Simplon Road from Geneva to Milan made 1800-5 by Napoleon I, is the grandest modern example extant of a mountain road. It is about 38 miles long, 27 ft. wide, and its rise and fall only about 1·25 inch for each yard run: PENNY CYCLOPÆDIA, 1842, s. v. Switzerland. It is said to have cost 17 millions of livres or about £650,000.

The surface of a roadway may be formed by broken granite, flint, or other hard stone, called MACADAM after the name of the inventor; or be paved with squared stones or opus incertum as at Rome, Turin, and Pompeii; or, as now usually done, with hammer-scabbled whinstone, granite, or syenite, known as "setts". An American invented cast-iron hollow cubes filled with concrete, but such paving has not been successful. Of late years wood blocks and asphalte have been used in towns for the decrease of noise and dust, and for facility of traction. GRADIENT. GRANITE (p. 76). GRAVEL WALK. HORSE POWER. METALLING, ballasting or bottoming. PAVEMENT. RESISTANCE. SLOPE. TRACTION. VIA.

R. R. R.

EDGEWORTH, *Const. of Roads, etc.*, 8vo, 1813. *Granite Block Pavement*, prospectus, 8vo., London, 1818. PAGET, *Economy of Road Maintenance*, 8vo., 1820. DONKIN, *Const. of Carriage way Pavements*, 8vo., 1824. FALL, *Surveyor's Guide, or Every Man his own roadmaker*, 12mo., Retford, 1827. MACERONI, *Hints to Paviours, plans for the improv. of Carriage Pavements*, 2nd edit., 8vo., 1833. HUGHES, *Practice of Making and Repairing Roads, etc.*, 8vo., 1838. PARNELL, *Treatise on Roads; plans, etc., for Holyhead Road by T. Telford;* 8vo., 1833; 2nd edit., 1838. LEAHY, *Practical Treatise on Making and Repairing Roads, etc.*, 12mo., 1844. MAHAN, *Civil Engineering, etc.*, 4to., Edinb., 1845, pp. 74-80. FOORD, *Notes on Building and Road Making*, 2nd edit., 8vo., Madras, 1852. BAYLDON, *Road Legislation, etc.*, 1857. BLENKHARN, *Specifications of Road Making, etc.*, 8vo., 1865. HUGHES, *Making and Repairing Roads*, 8vo., 1870. HUNTINGDON, *Road-maker's Assistant*, 2nd edit., 12mo., New York, 1872. GILLESPIE, *Manual of the Prin. and Practice of Road Making*, 10th edit., 8vo., New York, 1873. GILMORE, *Pract. Treatise on Roads, Streets, and Pavements*, 8vo., New York, 1876. CLARK AND LAW, *Construction of Roads and Streets; stone, wood, and asphalte*, 8vo., 1877. WILKINS, *Treatise on Mountain Roads, Live Loads, and Bridges*, 8vo., 1879. WHEELER, *Hints to Highway Surveyors*, 8vo., 1879. CODRINGTON, *Maintenance of Mac. Roads*, 8vo., 1879.

Standing orders of the House of Commons as to gradients of roads where crossed by railways. INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, Index, 8vo., 1881, p. 272. AIDE MEMOIRE, 8vo., London, 1845-52, 3 vols. RANKINE, *Manual of Civil Eng.*, 8vo., 1864. ASSOCIATION OF BOROUGH SURVEYORS, *Journal*. BUILDER *Journal*, 1851, ix, 686, *Laying Pavements*. 1858, xvi, 3, *Streets and Paving at Manchester;* and 691, *Regent Street and cost of Road making*. 1866, xxiv, 838, *Granite road making*. 1871, xxix, 783, *Impermeable roads*. 1875, xxxiii, 594, *Roads and Pavements of London*; and 656 and 678, *London roads and cost of them*. 1879, xxxvii, 721, WILLCOCKS, *Roads and roadways, various materials*. CIVIL ENGINEER, *etc., Journal*, gives 1839, ii, 201, *Experimental Road paving* in Oxford street, and in MIRROR

Journal; 1841, iv, 403, *Granite wear, Commercial road.* 1850, xiii, 367, *Road Traffic Statistics*, Paris and London. The "Euston paving" laid at North Western railway station, B. *J.* 1850, viii, 496; ARCHITECT *Journal*, 1850, ii, 108, 120, from Inst. of Civil Engineers, *Proceedings*; and C. E., *etc., J.*, xiii, 141. BRITISH ARCHITECT *Journal*, 1877, vii, 384-5, *Granite paving at Bradford.* BUILDING NEWS *Journal*, 1858, iv, 1263, *Road laying, concrete and ballast and labour.* 1867, xiv, 268, LATHAM, *Const., repair, and management of Roads.* 1868, xv, 312, *New Paving in Duke Street, Smithfield, as used at Manchester.* 1869, xvi, 427, *Cement for road making;* 535, *Roads as they should be.* 1871, xx, 379, *Making and repairing roads.* 1875, xxviii, 136, *Granite, Asphalte, and Wood Pavements.* 1876, xxxi, 119, *Const. and Maintenance of Public Highways.* 1878, xxxv, 520, BIDDLE, *On Mat., Cost, and Const. of Roads.* 1879, xxxvi, 488, 523, DEACON, *On Street Pavements.* ROYAL AGRICULTURAL SOCIETY, *Journal*, xii, pt. ii, 1876, gives WHEELER, *Roads and Highways, Construction, etc.*

Asphalte paving. Its first use was 1845 at Manchester, B. *J.*, iii, 263; B. N. *J.*, xiii, 535, 543. The platforms at the Liverpool Street Goods railway station 1867 were laid with Pyrimont Seyssell asphalte on concrete, following its use 1843 at Pickfords' and Co. depôt in Wood Street. Part of Threadneedle Street was laid 1869 with Val de Travers asphalte after the manner in Paris. B. N. *J.*, 1869, xvi, 545, *Asph. Roads.* 1870, xix, 73, *Asph. paving and Tar paving;* and 462, *Asph. paving under frost.* 1871, xx, 319. 1872, xxii, 122, 183. 1872, xxiii, 240, *American Asphalte;* and 354, *Asph.* v. *Blue Brick.* 1873, xxv, 212, 299, 303, 665. 1874, xxvii, 321, 358, *Asph. Paving.* xxviii, 643, *Asph. for paths and roadways.* PAVEMENT, p. 66. BITUMINOUS CEMENT.

Roads on Bogs; C. E., ETC., *J.*, i, 383 (and INST. OF C. E., i, 50), vi, 273; xii, 201; xiii, 107. MAHAN, *Civil Engineering*, 4to., Edinb., 1845, p. 74. *Chat Moss; Papers of* CORPS OF ROYAL ENGINEERS, 1845, vii, 143; C. E. ETC. *J.*, xi, 315; xii, 293; and QUARTERLY REVIEW, Feb. 1858.

In addition to the publications named s. v. MACADAM *paving*, are BURGOYNE, *Road making and maintenance of M. roads.* TELFORD, *Rules for making and repairing roads*, 8vo., 1838. SMILES, *Life of Telford, with Intro. history of roads, etc.*, 8vo., 1867. MITCHELL, *New mode of Constructing the Surface of Streets, etc.*, 8vo., 1865; and B. *J.*, xxiii, 820. CODRINGTON, *Maintenance of M. roads*, 8vo., 1879; and B. N. *J.*, xxxvi, 346. B. *J.*, 1849, vii, 461, *M. roads for Streets of Large Towns;* and viii, 115-6. 1855, xiii, 131, *Making Mac.* 1858, xvi, 15, 17, *Mac. and Granite.* 1868, xxvi, 789, 805, 863, 880, 931, *Road making and Mac.* 1874, xxvii, 989, *Large and small stones* v. *Mac.* C. E., ETC., *J.*, 1848, xi, 279, *Liverpool roads and streets, Mac. and Granite.* INST. OF C. E., 31 Jan., 1854, *Mac. roads for streets of towns, Birmingham.*

Iron paving, Blackfriars Road, HUGHSON, *Walks through London*, 12mo., 1817, ii, 398; GENTLEMAN'S MAGAZINE, 1818, pt. i, lxxxviii, 463. At Boston, DALY, *Revue Générale*, 1853, xi, 462, from B. *J.*, xi, 598, 635. Cast iron and concrete paving for roads, 1855, xiii, 548. Bent iron (corrugated) for roads, ANNALES DE LA CONSTRUCTION, 1856, ii, 30. Cast iron flooring plates, at the dockyards; B. *J.*, 1866, xxiv, 610; xxv, 308. Iron pavement in the City, 1856; in the Poultry 1862, removed 1863 Nov.; CITY PRESS *Newspaper*, 20 May 1865. Ordered to be replaced with granite, Nov. 1865.

Wood paving. Improved wood paving company; Croskey's close jointed wood pavement; Shiel's composite block paving; Asphaltic wood paving; Mowlem and Co.'s pavement; Prosser's wood paving; Henson's patent wood pavement. The Old Bailey was paved 1854 with wood by S. Carey, and repaved 1866 by him. Rankin's patent wood pavement, about 1837.

Plank road. The system originated in Russia, has since been adopted in Canada and in many of the northern states of America; that of New York being the first, about 1847. It is cheap, easy of draft, speed, and comfort; its duration is from eight to twelve years. The details for forming it are given in B. *J.*, 1855, xiii, 17; and B. N. *J.*, 1856, ii, 635. MAHAN, *Civil Engineering*, 4to., Edinb., 1845, p. 76. GILLESPIE, *Road making*, 10th edit., 8vo., New York, 1873. WEALE, *Dict. of Terms*, 12mo., 1849-50, p. 337.

The publications of the *Ponts et Chaussées* of France. LE SAGE, *Recueil de divers Mémoires*, 4to., 1810. MARY, *Cours de Routes et Ponts, — à l'Ecole centrale des Arts et Manufactures*, 4to. and fol., 67 pl. of roads and bridges, 2 vols., Paris, 1872. RONDELET, *l'Art de Bâtir*, 4to., Paris, 1805-10. REGNAULT, *Manuel des Aspirants au grade à l'ingénieur des ponts et chaussées*, 2 vols., 8vo., Paris, 1855. GAUTIER, *Traité de la const. des Chemins, etc.*, 8vo., new edit., Paris, 1721. RAMBUTEAU, 4to., Paris, 1834; 1837. CORDIER, *Constructions des Routes, etc.*; TEISSEREMY, *Voies de Communication.* BARTOLUCCI, *Diss. de Voies Publics.* BEAUDEMOULIN, *Amélioration des Chaussées de Paris*, in DALY, *Revue Générale*, 1854, xii, 266. Pontebra, a new road, with its tunnels, etc., in ALLGEMEINE BAUZEITUNG, 1843, pl. 523-5. ANNALES DE LA CONSTRUCTION, 1856, ii, pl. 38-40, etc. DALY, *Revue Générale*, i, 225, Roads *temp.* Philip Augustus.

ROAD DRIFT. The scrapings of a macadamized road when of flint have been advocated for hoggin as a binding material; BUILDING NEWS *Journal*, 1871, xx, 177. In the suburbs of the metropolis road drift is often used in making mortar, but it is by no means so good as fine sand, as it imbibes moisture considerably; but the mortar made with it stands heat well and is therefore useful for setting ovens, coppers, etc. As the scrapings of granite macadam roads are very muddy from decomposed felspar mixed with filth, they should be well washed before being used; CIVIL ENGINEER, ETC., *Journal*, 1838, i, 222; x, 311, from PASLEY, *Cements*, etc., 8vo., 1847, p. 9. MORTAR. 1.

ROADMAKING. The operations necessary to a road of Macadam are, metalling, blinding, watering and steam rolling; it may be used without injury twenty-four hours after the metal is laid on.

Steam Road Roller (Fr. *compresseur*). *On the McAdam Roads in Paris*, B. *J.*, 1866, xxiv, 266; and 347, which refers to a rolling machine formed of three rollers in width, used about 1831 at Shrewsbury. A steam locomotive was used 1866 in Paris, and tried in London, Oct. 1867; 1872, xviii, 390, 405, and 422. B. N. *J.*, 1869, p. 477; 1870, xviii, 390; xix, 70; 1871, xx, 379; 401; 1872, xxiii, 60; 73. PAGET, *Report on the Economical Road Maintenance and Horse draught through Steam Road Rolling*, with special reference to the metropolis, 8vo., 1870.

ROAM and ROAN (G. DA); see ROHAN (G. DE).

ROANE; see RHONE.

ROBBIA family; sculptors and workers in terra cotta. Luca della Robbia, born 1400, died 1481. VASARI, *Lives*, edit. 1850, i, 335-48, and Index. TERRA COTTA.

ROBE or Livery; see GOWN.

ROBELIN (CHARLES), born 1787 at Nevers, was a pupil of J. A. Alavoine. He restored before 1831 the archbishop's chapel at Reims, and the painted glass of the metropolitan church at Besançon; designed the restoration of Tours cathedral; and was charged before 1840 with important works at the cathedral at Nevers. CIVIL ENGINEER, ETC., *Journal*, 1840, iii, 171. His death has not been ascertained. 110

ROBELIN (MARC), of Paris, went 1630 to Havre and raised the grand portail in the rue S. Michel to the church of Notre Dame up to the capitals of the Corinthian columns; the remainder is modern. LANCE, *Dict. Biog.*

ROBELNY, ROBELINY or ROBELINI (.....), designed the hôtel de Léon, rue Garancière, faubourg S. Germain, at Paris, given in Grand MAROT, pl. 68; and the hôtel de Sourdiac for René de Rieux, bishop of Leon who died 1651, "architecture bizarre"; BRICE, *Nouv. Descr. de Paris*, 12mo., Paris, 1725, iii, 402. 5.

ROBERT; see ROBERTUS.

ROBERTS (HENRY), F.S.A., was a pupil of C. Fowler, and also in the office of Sir R. Smirke. In 1824 he gained two medals at the Society of Arts, etc. He designed 1831-3, Fish-

mongers' hall, London bridge; LEEDS, Suppl. to *Public Edifices*, 8vo., London, 1838; COMPANION TO THE ALMANACK, 1836; which p. 219, gives 1835 the Camberwell grammar school: 1844 the railway stations *first* erected at London Bridge; CIVIL ENGINEER, ETC., *Journal*, 1843, vi, 403; 454; ILLUSTRATED LONDON NEWS, iv, 76; COMP. TO ALMANACK, 1844, p. 241: 1846, S. Paul's (seamen's) church, Dock Street, East Smithfield, for 800 persons, cost £9,000; ILL. LONDON NEWS, viii, 321: and 1848 enlarged the National Scotch church, Crown Court, Covent Garden (des. by R. Wallace); and designed two schools adjoining. As architect to lord Shaftesbury's society for improving the dwellings of the neighbouring classes, he designed 1846-7 those in George Street, S. Giles's; BUILDER *Journal*, xix, 506; 562; ILL. LONDON NEWS, x, 61; COMP. TO ALM., 1848, p. 244: 1849-50 in Streatham Street, S. Giles's, B. *J.*, vii, 325; viii, 49, etc.: 1850-51, Thanksgiving Buildings, Theobald's Road, B. *J.*, viii, 369; the cottages at the Exhibition of Industry of All Nations 1851, re-erected as lodges in Kennington Park: and 1852 Dwellings at Windsor, B. *J.*, x, 469. He read papers on the *Dwellings of the Labouring Classes*, reprinted 1850, by order of the president of the French republic; with other writings mentioned s. v. LODGING HOUSE; others in CIVIL ENGINEER, *etc., Journal*, 1860, xxiii, 237; 325 and 373; followed by *Dwellings, etc.*, fol., 1867; and *Report on Dwellings, etc., Paris Exhibition*, 8vo., London, 1868. He also interested himself in this subject in Italy and Belgium. He died — April, 1876, at Florence.

ROBERTSON (DANIEL), designed 1826-7 the university printing office, at Oxford, which 1829-30 was added to by E. Blore; INGRAM, *Memorials of Oxford*, 4to., Oxford, 1849, iii, 16; and 1828, S. Clement's church.

ROBERTSON (WILLIAM), of Kilkenny, designed and erected 1816-9, Gowran castle, Kilkenny, for H. W. Agar Ellis, visc. Clifden and lord Mendip (NEALE, *Seats*, 4to., 2 ser. iii); erected 1817 Gracefield lodge, Queen's County, after a design by J. Nash (NEALE, vi); and superintended alterations to the north front of Kilkenny castle, for the marquess of Ormonde; WRIGHT, *Ireland Illust.*, 4to., Dublin, 1829, p. 34; his name is appended to the two views of the castle therein.

ROBERTUS or ROBERT; see HERBERT de Losinga; de BERHAM; of Lisbon, see COIMBRA; de COUCY; and de LUZARCHES.

ROBERTUS, architect to Charlemagne, IX cent., built the abbey de la Grasse; LANCE, *Dict. Biog.* This name is inscribed on two capitals, supposed Saxon, at the east end of the ailes at Rumsey abbey church; LATHAM, in ARCHÆOLOGIA, 1803, xiv, 136; xv, 304. The same name occurs on a base of a column, romanesque, in the church of S. Révérien (Nièvre); LANCE, *Dict. Biog.* ROBERTUS, "cœmentarius" under abbot Paul (1077-93), had lands and a house assigned to him for his great skill at S. Alban's abbey: BUCKLER, *History*, etc., 8vo., London, 1847, p. 5. Another succeeded H. de BERHAM or DEREHEM (ELYAS) at Salisbury cathedral, 1245-65: and another, called "the builder" was there when R. de FARLEIGH was engaged 1334 at the works.

ROBIN (.....), born 1804 at Roanne, was a pupil of Duphot. He went 1840 to S. Petersburg, where he designed the emperor's stud establishment; the residence for the duc de Leuchtenberg next to it; the German club near thereto; and a large number of houses after those at Paris. He was living at Bellevue near S. Marcellin in 1856. DUSSIEUX, *Les Artistes français*, 8vo., Paris, 1856, p. 431.

ROBIN (JEAN), was 1519 employed on the beffroi of the church of Notre Dame at S. Omer; and 1529-34 on the fortifications of Béthune. LANCE, *Dict. Biog.*

ROBIN (PIERRE), was 1400-11 master of the works to the city of Paris; and is again mentioned 1429-31. In 1437 a P. Robin designed the church of S. Maclou at Rouen, not completed until 1521. SAUVAL, *Hist.*, iii, 589. GUILBERT, *Villes de France*. LANCE, *Dict. Biog.*

ROBIN HOOD STONE; see PARKNOOK QUARRY. It is supplied in London in block, and in slab from 1 in. to 4 ins. thick; and as landings from 3 ins. to 7 ins. thick.

ROBINIA. A genus of plants. The best known is R. pseudacacia, Bastard or false Acacia, and Locust tree. It is called Green and Yellow Locust by MICHAUX, *North American Sylva*, 8vo., Phil., 1817-19; ii, 236-8; iii, 233-8. It was one of the first trees received in Europe from North America, where it grows in great abundance in the Atlantic states and in the south west; and is found in the western states of Upper and Lower Canada. Being of rapid growth it forms heart wood at a very early age; and grows in America to a height of 70 or 80 ft. with a diameter of 4 ft. The wood is of a greenish yellow colour marked with brown veins; close grained, hard, and compact; and of great strength; and much in repute for posts and rails, and treuails for framing. Its weight varies from 41 lbs. 8 oz. to 48 lbs. 1 oz. per cube foot. "Though costly, it is invaluable in moist situations for any posts, furring strips, or other woodwork that comes in direct connection with damp basement walls"; VAUX, *Villas and Cottages*, 8vo., New York, 1857, p. 60, STUART, *Dict. of Arch.*, (1830), s. v. Acacia. D. STEVENSON, *Building Materials, etc.*, in CIVIL ENGINEER, *etc., Journal*, 1841, iv, 267; and SURVEYOR, *etc., Journal*, 1843, iv, 290. PENNY MAGAZINE, 1842, p. 145-6. ACACIA. HYMENÆA. IRON WOOD. GLEDITSIA. A variety probably gives Briggalo or Bricklow, an interesting wood of New South Wales. Another variety is the Botany Bay oak; BEEFWOOD: CASUARINA. 14. 71.

ROBINSON (PETER FREDERICK), F.S.A. 1826, and F.G.S.; born 1776, a pupil of H. Holland, was 1795-8 with W. Porden; and 1801-2 resided at the pavilion at Brighton, superintending the works during the absence of his master. He designed 1805-7 Haus Town assembly rooms, Cadogan place; stabling at Hutton Bushel, Malton, Yorkshire, for G. Osbaldeston, esq.; Marine bath at Westport, Sligo, for marquess of Sligo; 1809 banqueting seat at Yedmandale, Yorkshire; 1811-12, Egyptian hall, Piccadilly, for W. Bullock, of Liverpool (NOTES AND QUERIES *Journal*, 1875, 5 Ser. iii, 284; PAPWORTH); 1813 town hall, market house, etc., at Llanbedr, Cardiganshire; 1814 Millfield cottage, Bookham, Surrey, for maj. gen. Bayley Wallis; and 1816 Fern Acres, near Fulmer, Bucks., for J. Woodcock, esq. In 1816 he travelled on the continent and to Rome. 1819 he designed alterations at Kiplin near Catterick, Yorkshire, for earl Tyrconnel; alterations for completing Bulstrode, for duke of Somerset; 1820 additions to Norbury park house, Surrey, for F. Maitland, esq.; 1821 restored Mickleham church, Surrey, and published *Essay on the Age, etc.*, 20 pl., 8vo., 1824; 1823 designed Ebberstone hall, Yorkshire, for G. Osbaldestone, esq.; 1824 cottages at Leamington for E. Willes, esq.; and cottage near Cheshunt, for E. Clarke, esq.; 1825 chapel at Leamington; *cir.* 1825 Trelissick, near Penzance, Cornwall, for Thos. Daniell, esq. (ACKERMANN, *Repository*, 8vo., London, 1827, ix, 64); 1826-8 alterations at York castle gaol; 1829-32 the Swiss cottage at the colosseum, Regent's Park (views in MIRROR *Journal*, 8vo., 1832, xx, 257-9); 1830 Woolmer lodge, near Liverpool, for sir James Macdonald, bart.; alterations to a castle in Sweden; 1831 considerable alterations to Singleton house, near Swansea, for J. H. Vivian, esq., M.P. (plans in his *Dom. Arch.*, 1837); alterations at Bridehead, near Dorchester, for R. Williams, esq., M.P.; a drawing room at Hever castle for Mrs. Waldo; Coalhurst, near Horsham, for dow. mar. of Northampton; 1832 Sampford house, Essex, for J. Hinxman, esq.; and 1836 competed for the new houses of parliament.

He projected the continuation of the *Vitruvius Britannicus*, fol., publishing *Woburn Abbey* 1827; *Hatfield House* 1833; *Hardwicke hall* 1835; *Castle Ashby* 1841; and *Warwick Castle* 1842 (?). He also published *Rural Architecture; designs for Ornamental Cottages*, 4to., 1823; 1850, 5th edit., with landscapes redrawn by J. D. Harding: *Ornamental Villas*, 96 pl., 1825-7; 1836 on stone by J. D. Harding; 1853, 4th edit.: *Village Architecture*, 40 pl.; 4to. 1830; 1837, 4to. edit. imp.: *Farm Buildings*, 50 pl., 4to, 1830: 1837, 3rd edit.: *Domestic Architecture in the Tudor Style*, 96 pl., 4to., 1837: *Gate Cottages, Lodges, and Park Entrances*, 48 pl., 1833; 1837, 3rd edit.: *New series of Orna-*

mental Cottages and Villas, 56 pl., 4to., 1838. Robinson was one of the first vice-presidents 1835-9 of the Institute of British Architects; and read 6 July 1835, *The newly discovered crypt at York Minster*, which was published; *Observations relating to the proposal for removing the choir screen*; and 5 Dec. 1836 *Oblique Arches*. J. Lansdown 1817, Geo. Jackson of Leamington, and J. Taylor, afterwards the architectural publisher, were pupils. He resided from about 1840 at Boulogne-sur-mer, where he died 24 June 1858, aged 82. BUILDER *Journal*, xvi, 458.

ROBINSON (SAMUEL), born 1752, exhibited designs from 1775-95; including 1786 "buildings now erecting on the banks of the Thames where the great fire happened off the Tower." He was surveyor to the estates of S. Thomas's hospital, those of S. Olave's grammar schools, the Cordwainers company, the parishes of S. Magnus London bridge, S. Margaret's Lothbury, and others; and was largely employed in valuations, etc., as for the property in new Regent street, at which time D. R. Roper was a partner. He designed 1814-5 the anatomical theatre for the hospital; and about 1833, at which time James Field was partner, he designed the north wing, entrance gates, and lodges as part of a general plan of rebuilding; the south wing, finished 1842 was carried out by J. Field. In 1817 he designed the British and Foreign School Society, Borough Road; and 1824 the S. Olave's grammar schools, Magdalen street, since rebuilt on another site. He built and endowed "the retreat" almshouses, at Hackney. The late D. Alexander 1782-9, and E. Nash, 1827-33, were pupils. He died 4 Sept. 1833, aged 82, at Finsbury circus.

ROBINSON (the hon. SIR THOMAS), bart., M.P., of Rookby park, Yorkshire, was born about 1700. As governor 1741-2 to 1747 of Barbadoes he designed an armoury, arsenal, and other public works. While travelling through most parts of Europe he visited and studied the Palladian edifices. Six plates 1730-7, in the king's collection, British Museum, of his estate at Rookby, with the west gateway and the bowling-green house, have his name attached to them; he is also said to have designed the parish church; and a mausoleum (WOTTON, *English Baronets*, 8vo., London, 1777, iii, 99); the house however is given as designed 1724 by W. Wakefield for T. Robinson, esq., in CAMPBELL, *Vitruvius Britannicus*, fol., London, 1731, iii, pl. 39; wherein iii, 16, is a Fishing lodge, or Newby house, Yorkshire, by C. Campbell for Sir Wm. Robinson, bart. Amongst other bridges by him is that of Winston bridge over the river Tees near Richmond, 1762-3, of one arch 108 ft. 9 ins. (or 112 ft. span), 22 ft. wide, and 20 ft. between the parapets, said to have been at the time of erection the largest in Europe; it was built of hard blue ragstone by John Johnson, a mason of Walsingham, and cost only £500; MACKENZIE AND ROSS, *Durham*, 4to., 1834, ii, 215; REES, *Cyclopædia*, s. v. Bridge; SURTEES, *Durham*, fol., 1816-40, iv, 35. He also designed an additional building to Ember court, Surrey, for rt. hon. A. Onslow, esq.; print in King's collection, British Museum: at Castle Howard, Yorkshire, 1753 the west wing; and (1728) the pyramid 28 ft. square and 50 ft. high, in memory of William lord Howard, beheaded 1639; NEALE, *Seats*, 4to., London, 1822, v: and the Gothic gateway at Bishop Auckland for the bishop of Durham. He died after 1771. KIMBER AND JOHNSON, *Baronetage*, 8vo., London, 1771, iii, 99.

ROBINSON (SIR WILLIAM), knight, was 1695 surveyor-general and vice-treasurer of Ireland. He is considered to have carried out 1680-86 the royal hospital of Kilmainham, Dublin, after a design by Sir C. Wren; GILBERT, *Dublin*, i, 135; BURTON, *Hist. of Kil. Hosp.*, 8vo., Dublin, 1843, p. 116-7; 227-8. He died 3 Nov. 1712.

ROBINSON (WILLIAM), published *Proportional Architecture, or the five orders regulated by equal parts*, 32 pl., 8vo., London, 1733; 1736: and *The Gentlemen and Builders' Director—every kind of Building—as regulated by an Act of Parliament* (14 Geo. III),—*and Directions to build Chimneys to prevent their Smoaking*, 8vo., London, n.d. (1775). Probably this same person (1767 architect and surveyor at Hackney), was the surveyor to the trustees of the Gresham Estate Committee, being 7 Augt. 1767 appointed to superintend the expenditure of the £10,000 voted by the House of Commons, for the general repairs to the Royal Exchange (*Royal Exchange, Extract from the Journals of Parliament* 1580-1768, fol., London, 1839, p. 45); some publications state he rebuilt the west front. His death was reported to the committee 13 Jan. 1768, and on Jan. 20 E. Crouch was appointed.

ROBINSON (WILLIAM), born about 1720 at Kepyer, near Durham, eldest son of William Robinson of S. Giles's parish, Durham; came to London at an early age, and 30 June 1746 was appointed clerk of the works to Greenwich hospital, succeeding J. James: he superintended 1763 the infirmary designed by J. Stuart: 1750-75 he assisted H. Walpole in carrying out part of Strawberry hill; BRITTON, *Toddington*, 4to., 1840, p. 14: 1755-62 was clerk of the works at S. James's, Whitehall and Westminster: 1766 secretary to the board of works, board clerk, and clerk itinerant: was also surveyor of the buildings of the board of customs of the port of London; designing 1770-75 the excise office, Old Broad Street (usually assigned to G. Dance, sen., and to J. Gandon), (print 1771 engraved by J. Robinson; CROWLE PENNANT in Brit. Mus., xii, 172; MAITLAND, *London*, 1775, pl. 125); it cost £37,407 18s. 7½d.; extra land, etc., £8,000. His clerk Brown became clerk to Sir W. Chambers. He made a design for rebuilding the Savoy, which was laid aside at his death for that of Somerset House by Sir W. Chambers; GWILT'S CHAMBERS, *Civil Arch.*, 1826, xlv. He died 10 Oct. 1775 somewhat suddenly of gout at his residence in Scotland Yard, and was buried in the chapel at Greenwich hospital. NOTES AND QUERIES *Journal*, 1858, 2nd ser., vi, 326; 1860, ix, 272. Of his sons; George, a judge advocate died 1822; John, clerk of the royal works at Kew, engraved the print of the excise office above mentioned; and Thomas, was a captain and a London magistrate. THOMAS ROBINSON, brother to WILLIAM, and master gardener to king George III at Kensington, was born 1727 and died 8 April 1810: FAULKENER, *Kensington*, 8vo., London, 1820, p. 214, records two inscriptions then in the church; and p. 298 that he erected Sheffield house, Silver street, Kensington.

ROBINSON (ROBERT), another brother, born 1734, practised at Edinburgh; was living 1752 and later. His son, ALEXANDER RAMSAY ROBINSON, lived at Sheffield house, died 1824 (GENTLEMAN'S MAGAZINE); and his son, THOMAS ROBINSON, let the site and gardens about 1860 for building operations.

ROBUR, or carcer inferior. The Roman underground dungeon in a gaol (*carcer*) in which the sentence of capital punishment was carried into execution. The state prisons constructed by Ancus Martius and Servius Tullius at Rome, show the construction. PARKER, *Archæology of Rome*, 8vo., Oxford, 1876.

ROCAILLE PIECE. "Mosaick work brought in the use of rocaille and shells for grottoes which are embellish'd with different figures; 'tis a modern invention, and it must be own'd there is nothing in this kind finer, either for the beauty, the disposition of the place and ornaments, or the choice of every part of the composition, than the Grotto at Versailles", etc.; (1703), 1736, s. v. Painting. D'AVILER, *Dict. d'Arch.*, in *the Explication*, etc., 839. H.

ROCAILLE STYLE; also called ROCOCO by many modern French writers. The elder de Cotte, the elder Gabriel, Boffrand, and Cartaud, who extended their contemporaneous practice of half a century's duration into the reign of Louis XVI, were so impressed by the novelties of plan introduced 1722 by Girardini at the palais Bourbon, and were so influenced by the favour shewn to the inventions 1715-45 of G. M. Oppenordt, the *père du genre rocaille*, as to be the representatives of the *style Louis XV*, which is seen in the houses of the faubourg S. Germain. AICARD, *Patria*, 8vo., Paris, 1847, p. 2191. "La rocaille triomphe sans conteste", by Louis, architect to the duc d'Orleans 1763 in the decoration he gave to the choir of Chartres cathedral. DE LA MAIRE appears to have been one of the most powerful pro-

moters of those fashions which about 1730-60 succeeded to that of Berain, "il semble avoir créé ce qu'on appelle le style rocaille"; ROUYER ET DARCEL, *L'Art Architectural*, 4to., Paris, 1863-66, ii, 59. Moreover, p. 64-5, they are astonished at finding before 1740 the hôtel de Roquelaure, now ministère des travaux publics, built by (L'Assurance) Cailleteau (died 1757), decorated 1733 by Le Roux (died 1740), "le rocaille a tout envahi." DALY, *Revue Gén.*, 1845, vi, 282. FRENCH ARCHITECTURE. LOUIS XV. 25.

In the smaller rooms, the sides are in this style; it is unconstructive, the lines and curves are confused, and are such as can be produced by an intelligent plasterer as well as by a first-rate artist. No genius could ennoble it and no taste refine it; FERGUSSON, *History of Modern Arch.*, 8vo., 1862. The paneling is formed of thin mouldings, broken or curved at the angles, forming various shapes, ornamented by leafage and husk work, with embossed grounds, musical instruments, figure subjects, masks, etc. It is a departure from the purer style of the period of Louis XIV, as shown in D'AVILER, *Cours d'Architecture*, edit., 1710 and 1720: but very fine work of this style in plaster still remains in France and England.

ROCCHI or ROCHI (CRISTOFORO), called a pupil of Bramante, designed after 1490, perhaps on the foundations laid about 1488 by Bramante (LAZZARI, p. 44) the cathedral at Pavia. MALASPINA, *Pavia*, fol., 1816, p. 7, 13, 14, 26, 27, 28, 63.

ROCH (WOLF); error for KOCH (W.), 1554 at Freiburg.

ROCHE. A very hard stone obtained in the environs of, and used at, Paris, supplied about 1870 at 2s. 4d. per ft. cube at the wharf at Deptford; the "demi roche", a hard stone, at 23d.; both for exterior use and in preference to Caen stone. Vergelet and Banc royal, both soft stones, but useful for exteriors, were charged 20d. and 22d. respectively: they were also called French Creil stones.

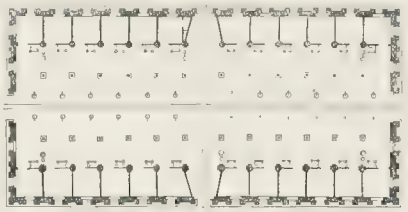
ROCHE (PIERRE DE LA), competed 1769 for the royal exchange, Dublin; ANTHOLOGIA HIBERNICA, 8vo., Dublin, 1793-4; BUILDER *Journal*, 1869, xxvii, 781. He published *Essay on the Orders of Arch.—some considerable alterations—a new great Order called the Britannic Order*, 4to., London, 1769. A "M. de la Roche", pupil of J. F. Blondel, is noticed in his *Cours*, 8vo., Paris, 1773, iv, 91.

ROCHE ABBEY STONE. The ancient quarry nearly adjoins the abbey of the same name, near Bawtry railway station, Yorkshire. It was well known to Sir C. Wren, who considered it produced the most durable stone in England after the Portland stone. By some persons it has been called BRAMHAM MOOR stone; POULSON, *Beverlac*, 4to., 1829, p. 679. It is locally called a sandstone but is of the magnesian limestone formation, and is of a beautiful white or cream colour; it is supplied in blocks of all sizes; and weighs 139 lbs. per cube ft. This stone was used at Roche abbey (AVELING, *History*, 8vo., Worksop, 1870), the deanery at York; Tickhill church and castle, Blythe and Bawtry churches, and at many others in Yorkshire; and Selby hall. Commissioners' *Report on Building Stones*, 1839.

ROCHEAD (JOHN T.....), born 1814 in Edinburgh, became a pupil of D. Bryce, R.S.A. In 1837-9 he was principal draughtsman in the office of Hurst and Moffatt at Doncaster; 1840 gained first premium for a Roman Catholic cathedral at Belfast; commenced practice 1841 at Glasgow, where he designed 1845 S. John's free church, cost £5,600; 1858 Park church, cost £8,000; West End church; 1859 John street United Presbyterian, cost £8,000; 1856 Unitarian chapel, S. Vincent street, £3,000; buildings in Irongate and Nelson street; parish church at Renfrew; 1859-60 S. Mary's free church, Albany street, Edinburgh; all Gothic: bank of Scotland, George street, Glasgow (Italian); made a design for the Glasgow university (Italian); and obtained 1857 the first prize of £300 for the War Office designs in the Government Offices competition in London; designed Knock castle; West Shandon (*Executed Examples of Eccles. and Dom. Edifices*, 4to., 1858); Blair Vaddoch; and Sillerbut hall, Hawick; the Wallace monument on Abbey Craig, Stirling; and the Adelphi theatre at Glasgow. In 1870 he left Glasgow for Edinburgh, where he resided until his death 7 April 1878. BUILDER *Journal*, xv, 372; and xxxvi, 393, 413; BUILDING NEWS *Journal*, xxxiv, 384.

ROCHE LIME. A term applied in Ireland to the stronger lime used for mortar.

ROCHELLE, LA (Anc. Rupella Santonum; Santonum portus). A seaport and capital of the department of Charente Inférieure, situated in a bay out of the Bay of Biscay. Two round towers 1418 remain of the castle; the town was acquired 1557 by the Huguenots; the fortifications 1572-74 were rebuilt by Vauban after the second great siege 1627-8 at which time the stone dyke was formed by the engineer Metezeau. There are seven old gates; houses have portions of small height; mayor Guiton's house is Renaissance with tourelles. The town is the see of a bishop transferred 1665 from Maillezay. The cathedral dedicated to S. Louis IX, was designed from 1735 by J. Gabriel, (or the portail only is ascribed to him) and completed 1862. Of the parish churches, that of S. Barthélemy dating *cir.* 1150, ascribed to P. de Mognon, a Cluniac monk, is now destroyed, but the tower exists; S. Laurent and S. Nicolas are modern; the former has a fine old tower and a west porch in ruins; the lofty tower XV cent. of S. Sauveur is used as a shot tower. The hotel de ville founded at end of XIII cent. shows traces of work from 1486 to 1607; ROUYER ET DARCEL, *L'Art Arch. en France*, 4to., Paris, 1866, ii, pl. 27; the tour de la lanterne with a spire, *cir.* 1375 (or 1445-76) now serves as a land mark; VIOLLET LE DUC, *Dict.*, s.v. Tour, p. 182-7 (LIGHTHOUSE). The porte d'horloge, rich Gothic, has a spire. The abattoir, before



1823, 136 ft. long by 69 ft. wide, cost £4,000. The sea bathing establishment dates 1827. No other buildings are specially mentioned. ARCÈRE, *Hist. de la R.*, 4to., 1756. MASSIOU, *La R.* LANCELOT, *La R. et son arrondissement*, 60 pl., fol., 1875. JOANNE, *Itineraire*, 1868. 14. 28. 50. 96.

ROCHELLE (R. DE); an error for ROTHELEY (R. DE).

ROCHESTER (Anc. Durobrivum). A city in the county of Kent, in England, situated on the river Medway, over which was a stone bridge of eleven arches and 560 ft. long, *cir.* 1400, destroyed 1857 after the new bridge by Sir W. Cubitt, C.E., had been erected lower down; BUILDER *Journal*, 1856, xiv, 417, which shows the railway bridge, by Sir J. Cubitt, C.E.; 1863, xxi, 565; HUGHES, 1851, at Inst. of Civil Engineers; and in CIVIL ENGINEER, *etc., Journal*, xiv, 286; and xx, 44, half destroyed; BUILDING NEWS *Journal*, 1857, iii, 917, explosion; 1875, xxviii, 585, chapel of S. Bartholomew, early XII cent.; and 1878, xxxv, 264, bridge chamber or record room; ILLUSTRATED LONDON NEWS, 1856, xxiv, 170, shows the three bridges; PENNY CYCL., Suppl., 1858, s.v. Bridge. The castle, an area of about 300 ft. square, with walls 20 ft. high and 7 ft. thick, and towers at intervals, with a ditch on three sides, was superintended by Odo, bishop of Bayeux, and stood the great siege of 1088. The KEEP, usually but erroneously attributed to bishop Gundulf, is 70 ft. wide and 104 ft. high, and divided into two by a thick wall in which is a well accessible from each story. This keep is one of the most perfect specimens of military architecture remaining in England. A warrant, 15 Dec. 1599, directs the using of serviceable stone for repairs at Upnor Castle, British Museum, *Add. MS.*, 5752, f. 350; and about 1725 the lead, timbers, and freestone of the keep were removed; STOREK

AND GREIG, *Antiquarian, etc., Cabinet*, 12mo., London, 1811, ix; B. *J.*, 1859, xvii, 353, by A. Ashpitel; 1863, xxi, 672, by Hartshorne; castle grounds, B. N. *J.*, 1870, xix, 299; 1871, xx, 364; and 1875, xxviii, 138. The *compotus* 1368-9 in the Record Office, is given in FREEMASON'S MAGAZINE, 4to., 1862, vi.

The cathedral dedicated to S. Andrew, founded about 604, had the nave rebuilt by bishop Gundulf (1077-1107) and the tower to the north transept supposed to have been entered from the top only; the west front is supposed to be by bishop Ernulphus or Arnulph (1114-24) who also erected other portions of which the dormitory, refectory, and chapter house alone remain; the early English crypt is one of the best of the class; the great transept dates *cir.* 1200; the choir and ailes 1201-27; the church was consecrated 1240; the door (decorated) to the chapter house is remarkable; the bell tower 1319-52. In 1825-30 the central tower was rebuilt and many restorations effected by L. N. Cottingham, and from 1871-75 it was repaired under Sir G. G. Scott, who designed the organ case, BUILDER *Journal*, 1878, xxxvi, 884. GUNDULPH. ROCHESTER, (E. OF); B. N. *J.*, 1870, xviii, two views 108; doorway 467; 1871, xxi, 36, clerestory windows of nave replaced; 1874, xxvi, 24, 216; 1875, xxviii, 705, nave remains to be restored. KING, *Cathedrals* (Murray), 1861. WINKLES, *Cathedrals*, 8vo., 1836-42. The two parish churches of S. Margaret and S. Nicholas (repaired 1862, B. *J.*, xx, 118) have ancient fonts; S. Peter's 1858, is by E. Christian, B. *J.*, 1858, xvi, 699; 1859, xvii, 782; Congregational church, by J. Tarring, *idem*, 1852, x, 414; Royal free grammar school was founded by Henry VIII; clock house built on site of former town hall; town hall (Doric); ancient market cross; free school founded 1701; house for lodging six poor travellers for one night; S. Katherine's leper hospital 1316, new almshouses; new convict prison at Borstal for 500, B. *J.*, 1874, xxxii, 404; corn exchange, B. N. *J.*, 1869, xvi, 569; Eastgate house, end of XVI cent., B. *J.*, 1846, iv, 570; and p. 498, the "Quarries", *temp.* Henry VIII of red brick. FISHER, *Hist. and Antiq. of R., etc.*, 8vo., Roc., 1772; ARCHÆOLOGICAL ASSOCIATION, *Journal, walls*, iv, 31; castle, 1853, ix, 215, 339; cathedral by Ashpitel, 272; and ILLUSTRATED LONDON NEWS, xxiii, 81; ARCHÆOLOGICAL INSTITUTE, *Journal*, 1863, xx, 205, 397; Willis on cathedral 389, and xxi, 1-17; old bridge 390. KENT ARCH. ASSOCIATION, *Journal*, 1859, etc. 1. 14. 50.

ROCHESTER (ARNULPHUS DE, or Arnulf, Earnulph, Ernulph, or Ernulfus), was born about 1040 at Beauvais, became a pupil of Lanfranc at Bec, then a monk of the monastery of S. Lucian, invited to England by Lanfranc, became a monk at Canterbury; appointed after 1089 prior at Rochester; 1096 prior at Canterbury, where he superintended the erection of the choir finished by prior Conrad; 1105 or 1107 appointed by king William abbot at Peterborough, where he completed the chapter house, built a dormitory, refectory, and necessarium (*Chron. Joh. Abb.*); and was 28 Sept. 1115 elected bishop of Rochester, when he completed the cathedral, perhaps by adding the west front; and of the remainder, the dormitory, refectory, and chapter house, alone remain. He was the author of *Textus Roffinsis*, printed by HEARNE, 8vo., Oxford, 1720; and died 15 March 1124 at Rochester, aged 84. THORPE, *Custumale Roffense*, fol., London, 1788, p. 160-1. HUGO, in ARCHÆOLOGICAL *Journal*, 1854, ix, 235-7: ASHPITEL, 274. DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1851, p. 115.

ROCK-CUT WORKS. *Rock chambers* are very extensively distributed over Europe and Asia; they abound particularly in the north of these regions, but they have been found as far south as Bombay; in no case is it known by what people they have been raised. Some antiquaries divide them into three classes, distinguished by the remains found in them, the stone, the bronze, and the iron. The Dungannon rock chamber is described as being near the summit of the barrow. The barrows are usually found on what seemed to be the natural level of the soil, and the floors of the chambers, with one exception, below that level—in the Brennanstown one, perhaps 3 ft. The common people at Gravina, Matera, and Arcano, in Calabria, live in caves excavated in the tufa; *Handbook South Italy*, 1853, 465-6, 471. Those at Aleppo or Bercea; CHESNEY, *Euphrates*, i, 435; and SMITH, *Dict. Geog.*, p. 394. The *Description de l'Egypte*, 1821, i, 257, mentions the quarries at Gebel Selselch as *grottes* (and throughout it); at Grimé are thousands of caverns once inhabited called *cryptes* in Index, and iii, 163, 319: 195; iv, 136, 273; v' 259, 369; vi, 248: thousands of excavations exist at Okhtchaput, iii, 402; v, 275; vi, 298, 305, 337. At La Roche Guyon, *Handbook*. Cundeegurree, BLACKIE, *Gazetteer*. Others in BODE, *Lauristan*, i, 66. In yellow chalk (*craie tuffrau*) in cliffs on the bank of the river Loire; *Handbook France*, 1861, p. 170. At Cadigno, *Handbook Ionian Islands*, 311. *Handbook South Italy*, Index. ALL THE YEAR ROUND, March, 1866, p. 207.

Rock-cut Church, at Calholiko in Crete; *Handbook Ionian Islands*, 352: at Bretzenheim; WHEWELL, *Notes on German Churches*, 8vo., 162: La Madonna del Parto, near Sutri, three ailes separated by square pillars left in the tufo, older than XIV cent.; DENNIS, *Etruria*, i, 92: nave, ailes, and chapels, XII cent., at S. Emilion, lighted from the end only, tower and spire built at the top of the hill; TURNER AND PARKER, *Domestic Arch.*, 8vo., Oxford, 1851, i, 273; ii, 170: church and abbey at S. Roman, near Beaucaire.

Rock-cut fortification. FROSSARD, *Nimes*, 196. *Handbook France*, edit. 1852, p. 90, 185, 402, 415. *Handbook South Germany*, 1857, p. 408. Fortified dwelling of three vaulted chambers, in park belonging to M. de Rivais-Mazères, commune of Flac, near Lavaur, Tarn.

Rock-cut temple or *Cave temple*. "From the time of Dasaratha, the grandson of Asoka, who, two hundred years B.C., excavated the first cave at Rajagriha, to that of Indra Dyumna, who apparently finished the last of those at Ellora, the series is uninterrupted; and if properly examined and drawn, the caves would furnish us with a complete religious and artistic history of the greater part of India during fourteen centuries, the darkest and most perplexing of her history. Hardly one excavation has been made or attempted since that period, except perhaps some rude Jain monoliths in the rock at Gwalior, and it may be one or two in Southern India." In Hindostan; as at Ajunta; Mahamalaipura; Karli; Elephanta; Cacahuamilpa, FULLARTON, *Gazetteer*; Orissa; FERGUSSON, *Rock-cut Temples*, fol., London, 1845; and FERGUSSON, *Rock-cut Temples*, 74 phots., by major Gill, 8vo., 1864; BUILDING NEWS *Journal*, 1865, xii, 744. FREEMAN, *Hist. of Arch.*, 8vo., 1849, p. 55-7; 60-79; 81. CHAITYA CAVE. GROTTO. MONOLITH. ABOOSIMBEL and others in Egypt.

Rock-cut Tombs; Gebel Aboofayda; A. B. EDWARDS, *Nile*, 8vo., 1877, i, 142-3. BENIHASSAN; THEBES; and others in Egypt.

Rock-cut Town; at Ipsica, in Sicily; DE NON, *Travels in Sicily and Malta*, 8vo., London, 1789, p. 374-6.

ROCKHILL PAVING. Same as CAITHNESS STONE; see also BUILDER *Journal*, ix, 665; 1858, xvi, 269; xix, 813; xxvii, 390. *Experiments on strength of Caithness pavement*, by BUCHANAN, at Royal Scottish Society of Arts, 26 Nov. 1849; and in CALEDONIAN MERCURY, 10 Dec. 1849. BUILDER *Journal*, 1881, xli, 673.

ROCKING STONE or LOGAN. (Fr. *pierre branlante*). CELTIC ARCHITECTURE. DRUIDICAL WORKS.

ROCKWORK in gardens. An elevation composed of stones, fragments of rock, brick, clinkers, etc., with earth and other material between, amongst which plants adapted for such a situation are grown. BUILDING NEWS *Journal*, 1865, xii, 436. MASON, *Works*, 8vo., 1811, i, 409. BUILDER *Journal*, 1865, xxiii, 15. LOUDON, *Country Residences*, 4to., 1806, ii, 368. In 1868. Puig was in repute as the "rockwork architect". QUARRY. 14.

ROCK-WORKED STONE; see RUSTIC WORK.

ROCOCO, STYLE (Ger. *barocken*), supposed from Fr. *rocaille*, rockwork; and *coquille*, a shell. A later phrase of French architecture than ROCAILLE. The styles de Louis XV (1715-74, the regency of Philippe d'Orleans ending 1725) were eight (as

explained s. v. LOUIS XV, and FRENCH ARCHITECTURE), six of which, taken in the aggregate, inclusive of the *styles Maintenon* and *Watteau* that lasted 1685-1785, and are derisively termed the *style* PERRUQUE, by HOFFSTADT, p. 164; the *verschnörkelungs periode* of NAGLER, s. v. Gabriel; and the *rococo* of the *Complément* to the *Dictionnaire* of the *Académie Française*. The term would be properly restricted to the style Pompadour 1745-65, and the style Dubarri 1769-74. FERGUSSON, p. 221, writes the "style known as Louis XIV or rococo"; he regards it as Italian (French by origin), and "the only thing approaching to one that has been invented since the Renaissance". He gives as an example the cabinet des médailles at Versailles, dated by ROUYER ET DARCEL about 1735. The mansions in the faubourg S. Germain represent this style. The works of Lajoux, Meissonier, and Pinault may be consulted. The meagre ornamentation of the rocaille became more debased by the use of rock work, shells, contours of all shapes, showing withal a luxuriousness of composition too easily followed. BLONDEL, *L'homme du Monde*, 8vo., Amst., 1774. PARIS, *Souvenirs de*, fol., Paris, 1836, p. 73. *Messager des Sciences, etc.*, de la Belgique, 8vo., Ghent, 1833, i, 449. NOTES AND QUERIES *Journal*, 1869, 4th Ser. iv, 241. DALY, *Revue Générale*, 1845, vi, 282. CAPRICE. BAROQUE. BIZARRE. OUTRÉ. PERRUQUE.

DALY, *Revue Gén.*, 1865, xxiii, 50, writes: "Le style Louis XVI (1774-93) succédant aux fantaisies 'rocailles' du style Louis XV, fut un hommage rendu à la sagesse et à la raison, à la suite d'une période de debauche d'esprit et de gôut. Ce fut le régime après l'orgie." NEUFFORGE, *Recueil élémentaire d'Arch.*, 8 vols., fol., Paris, 1757-68, and 2 vols., 1772-7, presents designs of correct Italian architecture.

"This new French style, to which the injurious name of ROCOCO has been given, has no resemblance to the *rococo* of Borromini and others of his school; their ornaments are pure *décadence*; it is bizarre, extravagant, ridiculous, *lourd*, and in bad taste"; DUSSIEUX, *Les Artistes Français*, 8vo., Paris, 1856, cxxxvi.

ROD. A measuring implement. The *acæna* (Gr. *ακαινα*), a Greek decemped or ten foot rod used in measuring lands; BEVERIN, *Syntag. de Ponderibus*, etc., p. 177; RICCIOL., *Georg.*, lib. iii, c. 4; SALMAS, *Ex. in Solin.*, p. 682. MENSOR. *Quincupedal* or 5 ft. rod;

> Puncta notus (or notis) ilex, et acutâ cuspide clausa,
> Saepe redemptoris prodere furta solet. (B. xi, cxlvi.)
>
> The punctur'd holm, with taper ferrel bound,
> Will oft the wily jobber's craft confound.

MARTIAL, *Epigrams*, by J. ELPHINSTONE, 8vo., London, 1783; and 4to., London, 1782, p. 429. The incised slab of the architect H. Libergiers, now in Reims cathedral, exhibits the instruments of the profession, amongst which is a measuring rod; DALY, *Revue Générale*, 4to., Paris, 1840, i, 195. METRODES. The "ten foot rod", in LEYBOURN, *A Platforme for Purchasers*, etc., 1685, p. 314. The "five foot rod", in LEYBOURN, *Architectonice*, added to the 6 edit. of the *Mirror of Architecture*, 1721, by R. M., at p. 57. A modern example occurs in the brass in the north choir aile of Ely cathedral over the grave of G. Basevi.

ROD. The same as POLE OR PERCH. A long measure of 16 ft. 6 ins. A square measure of 272.25 ft., by which brickwork is calculated in London, the thickness being "reduced" to one and a half brick thickness, or 1 ft. 1½ inches.

ROD. A rod of brickwork laid in five days, "by a trowelman and labourer although but slow", in preface to SALMON, *Vade Mecum*, 1755, 3rd edit. For average quantity per day in bridge work; INSTITUTION OF CIVIL ENGINEERS, *Proceedings*, x, 226. BRICKWORK, p. 142 and 145.

ROD; see LIGHTNING CONDUCTOR.

ROD (JOHANN), 1470, was busy on the building of the red tower (des rothen thurmes) at Halle. 92.

RODARIO (TOMMASO DI), of Maroggia, completed 1487-1526 the sham western façade (late Gothic) to the cathedral at Como, and designed 1513 in a Renaissance style the choir and transepts; the lateral doorways are also by him, that on the south west dates 1491-1509; executed 1492 the altar of Sta. Lucia in it. He is supposed to be the same as Tommaso Lombardino who arranged in its present form the church of S. Eustorgio at Milan, finished by F. Ricchini. LATAUDA, *Descrizione di Milano*, 8vo., Milan, 1737-8. COMO. WEBB, *Cont. Eccles.*, 8vo., London, 1848, p. 194, calls him Rodaris, from an inscription. 28.

RODE and RODE SOLLER; see ROOD.

RODE. In the fen districts, to cut weeds in watercourses. In small streams, this is done by sickles or rakes with cutting teeth on long handles; in rivers, with scythe blades formed into a chain by loose rivets as hinges, and drawn along the river-bed by horses on either bank. George Hamit has patented a roding machine; BUILDER *Journal*, 1881, xli, 420, 471. R. R. R.

RODEZ or RHODEZ. (Anc. Ruthena or Segodunum). The capital of the department of Aveyron, in Languedoc, France, situated on a hill at the foot of which flows the river Aveyron. A Roman aqueduct is still in use. Timber houses with projecting stories line the narrow and winding streets; the house *cir.* 1540, of G. d'Armagnac, place d'Olmet, and others, are by G. Philandrier. It is the see of a bishop. The cathedral dedicated to Nôtre Dame, rebuilt many times, by bishop S. Dalmatius, was 580 incomplete. It dates chiefly 1275; the choir XIV cent.; the remainder and great part of nave XV cent.; the first two cross vaults, the tribune, etc., the door to the sacristy, and the façade (Renaissance), *cir.* 1535, by G. Philandrier; the *cloture* of the choir and organ finished 1526 by de Cusset, master mason; given in BERTY, *Ren. Mont. en France*, 4to., Paris, 1864-58, pl. 31-2. Front view in LABORDE, *Mons. de la France*, fol., Paris, 1836, ii, pl. 205. The terrace to the episcopal palace was planned *cir.* 1550 by G. Philandrier; the principal mass now dates 1704 by J. Parate. Besides the usual buildings, are the old monastery of the Cordeliers; and that of the Dominicans, the chief portail and two galleries of which, 1672, are by J. Parate and J. Lacroix. NODIER ET TAYLOR, *Voyages Pitt.*, Languedoc, fol., Paris, 1833-42, i, pt. 2. p. 66, gives the tower, 250 ft. high, jubé, throne, Renaissance chapel, entrance to sacristy, all in the cathedral; and the cloister of the Celestine monastery. 14. 28. 50. 96.

ROD-FALL. A line of division between property.

RODI (FAUSTINO), of Cremona, born 15 Feb. 1751; a pupil of E. Petitot of Parma; designed at Cremona 1793 the two gates of S. Luca and Ognisanti; the palazzi vescovile, Silva ora Persichelli, Zaccaria ora Pallavicino (F. BIGALO); and Stanza a S. Vincenzo; the churches at Covo and Romanengo; and 1820 the theatre at Pontevico. He was living in 1827. 57.

RODI (JUAN ANDREA), designed the transept at Cuença cathedral; 1577-85 its quadrangular northern cloister (Doric); and 1588 *estuvo* in Salamanca to examine the drawings made for continuing the cathedral. 66.

ROD IRON. Rolled iron circular in section, so called in contradistinction to BAR IRON, which is rectangular in section. The weights per foot run are set forth in the *Price Books*.

RODOLPHINUS. A name inscribed 1167 on the façade of the church of S. Bartolomeo in Pantano, at Pistoja.

RODRIGO (A.....), 1390 did the capella de los reyes to the church of the cartuja (el Paular), near Segovia; MADOZ, *Dic. geog. etc., de Espana*, 8vo., Madrid, 1846-50.

RODRIGO; see EANES OR ANNES (R.)

RODRIGUEZ (JUAN), 1373, at Seville; see el maestro HALI.

RODRIGUEZ (FRANCISCO), 1472-78, was a *maestro mayor* at Seville cathedral. 66.

RODRIGUEZ (ALFONSO), was 1503 *maestro mayor* at the cathedral at Seville, succeeding Jimon or Ximon; G. de Rojas in 1507 finished the cupola. In 1509 and 1510 he and A. Egas of Toledo consulted as to the design for a cathedral at Salamanca (A. EGAS), which was presented to the authorities 2 May 1510, but eventually put aside for one commenced 12 May 1513 by J. Gil de HONTANON. In 1509 he reported on the bridge of Zuazo outside Leon. STREET, *Spain*, 8vo., 1865, p. 85; 459. 66.

RODRIGUEZ (ANTONIO), began and laid the first stone 10

March 1682 of the real colegio de S. Telmo outside Seville, and is therefore presumed to have designed that edifice. As *artifice y maestro de obras* he was deputed to superintend the construction of the church de los Mareantes, or S. Telmo, and had a long consultation with A. Gonzalez on its correct proportions. On 26 Sept. 1694 he approved the work at the collegiate church of S. Salvador at Seville. 66.

RODRIGUEZ (CRISTOBAL), of Jarama, was 1680 inspector and master of the works at the Escurial; 26 Feb. 1681 designed a hermitage to S. Marcos at Aranjuez, which became the parish church of Alpages; and 1690 was completed, except the chief chapel, by him, and he placed an inscription on the façade. 66.

RODRIGUEZ (JUAN), 1415-35 built for the celebrated bishop don Pablo de Santa Maria, the Dominican church of S. Pablo at Burgos; the foundations had been laid 140 years previously. It consists of a nave only, so large that it appears more like a cathedral than a church. STREET, *Spain*, 8vo., 1865, p. 52-3, describes it as of the usual form. 66.

RODRIGUEZ (DON VENTURA), born 14 July 1717 at Cienpozuelos, near Madrid, became a pupil of the Frenchman E. Marchand, then at Aranjuez, and copied the drawings of J. de Herrera, of Galucci and Bonavia, and of Juvara at Madrid; on 18 June 1741 he was named second designer by Sacchetti, Pavia, and Carlier of the palace, and in 1752 first designer. His first executed work appears to be 1736 the designs for a chapel at Colmenar Viejo. Among those at Madrid are 1743 the retablo for the hospital of S. Luis of France: 1749 the elliptical church of S. Marcos: 1754 the façade to the monastery of the Premonstratensians in la calle de la Inquisicion, since destroyed: 1755 the interior decoration of the church of the Augustinian nunnery de la Encarnacion (designed 1611-16 by J. Gomez de Mora), with the large retablo: the large "hospital general" in la calle de Atocha, containing a gallery, a foundling, and a refuge; the principal façade 968 ft. long is one of the finest edifices of the sort in Europe: 1758 the triumphal arches and other works for the entry of Charles III from Naples: 1759 corrected many irregularities in the palace staircase: 1761 the church of the PP. del S. Salvador behind la calle de la Concepcion Géronima: 1762 the very large pig slaughter-house and bacon store opposite the convent of Sta. Barbara, having a good façade: 1762 the city prison called la casa del Saladero near the gate of Sta. Barbara: 1763 the chief retablo to the parish church of S. Justo y Pastor (by Bonavia): 1767 the theatre of the caños del Peral for masquerades: 1769 the decorations to the presbytery of the church of S. Isidro el real, and some small alterations, enriching the cloisters with pilasters, etc.: 1770 the little bridge at Cava baja to avoid a precipice: 1773 the beautiful stone cross placed in the plazuela del Angel on the site of the altar of the demolished oratory of S. Felipe Neri, and now in the cemetery outside the gate of Toledo: the palace of the duque de Liria, near the gate of S. Bernardino (a story has been removed); the fine residence of the Alva family, since injured by successive fires: part of that of the marques de Astorga, of great magnificence: 1775 the fountains in the Prado, and the sewer outside the gate of Atocha, which has an inscription, the only known one recording Rodriguez (AQUEDUCT, *Detached Essay*, p. 17): 1778 reparation and decoration of the interior of the parish church of Sta. Maria, and designed the retablos: 1783 the graceful fountain de los Galàpagos, in the calle de Hortaleza, and various arches and reservoirs: 1784 the tomb of Manuel Ventura de Figueroa, in the parish church of S. Martin: the retablos for the capilla de los arquitectos of N. S. de Belen in the church of S. Sebastian: and 1785 the slender gates to the large slaughter-house in the calle Imperial, which he drew the day before his death.

Provincial cathedrals; for Zaragoza he 1753 designed the rich oval chapel of the Virgin under the cupola, rebuilt the walls of the old edifice around the chapel, left a design for a grand façade to the cathedral: and designed in coloured marbles for the chapel of S. Lorenzo the retablo, the finest in the city: for Cuença, the retablo mayor, and the one above it of S. Julian in richer materials: the façade of the cathedral of Santiago in Galicia, begun 1764: 1765 at Jaen cathedral he inspected the works and furnished designs, comprising the *sagrario*, the high altar, eleven small retablos in chapels, the larger retablo, two organ lofts, and two sedilia in the choir placed in the middle of the edifice; but the only one adopted was that of the capilla del Sagrario on the north side; it was executed by M. Godoy. In 1770 he designed the *trascoro* at Almeria cathedral: 1771 a tabernacle in marble and bronze: 1772 finished the designs for the Corinthian façade to the chief church at Toledo: 1777 two retablos for the capilla de los reyes nuevos: and 1778 a tabernacle for the presbytery at the cathedral at Malaga: 1783 designed the façade and portico to the cathedral at Pamplona, since executed by Santos Angel de Ochandategni, and one of the finest in Spain of the period: and directed the translation of the altar in the chapel at Riofrio, to the *trascoro* at the cathedral at Segovia. *Colleges.* In 1771 he designed the collegiate church of Santa Fè, in the diocese of Granada, carried out by D. A. Lois Monteagudo. *Churches, etc.* In 1755 the Benedictine church of the monastery of S. Domingo de Silos, in Castilla la vieja: 1759 the convent of the Agustinos misioneros de Filipinas in Valladolid: 1764 the façade de la Acebacheria at the cathedral at Santiago, carried out by D. Lois Monteagudo: 1767 the façade to the parish church of S. Sebastian at Azpeitia in Guipuzcoa, carried out by F. Ibero: 1768-90 the parish church and convent of S. Gabriel at Badajoz of the reformed Franciscans: designed the cupola to the parish church of S. Antolin at Cartagena: demolished the church of La Guardia, and designed a new façade, with retablos: 1773 repaired the monastery of the barefooted Carmelites at Alcala de Henares: 1778 designed the elliptic church of S. Felipe Neri at Malaga, carried out by J. M. de Aldehuela: 1779 the church at Algarinego in the province of Granada: the church of S. Sebastian at Almeria: and among many other churches that at Vera in Andalucia; at Cajar in the diocese of Granada: 1784 at Orotava in the isle of Teneriffe; and the presbytery, tabernacle, pulpit, and side retablo for the new church at Berja, begun by him in 1771.

In chapels: 1755 the sumptuous chapel of S. Pedro Alcantara in the convent of the Franciscos descalzos at Arenas; it was engraved by M. S. Carmona: and 1764 a chapel in the church of Mancha real in Jaen, for bishop B. Marin. Many other *retablos* are described besides those above named. *Colleges.* In 1772 the dome of the church of the college of Ninas pobres de Sta. Victoria, at Cordoba, erected by B. Dreveton or Greveton, having fallen down, Rodriguez thickened the walls, decorated the church, wrote particulars for rebuilding the college, and designed a library for the episcopal palace.

Hospitals and casas de misericordia. In 1768 he sent a design for rebuilding the church with cupola of the hospicio provincial at Oviedo, completed by M. Reguera Gonzalez; the cupola is 50 ft. diam. and 100 ft. high: 1778 the hospital at Olot in Catalonia, 320 palms long and 216 wide, having a chapel with two cupolas: enlarged and incorporated the casa de misericordia at Gerona with the hospital: and 1782 completed the casa de niños de la providencia at Malaga. Among the *courts of law*, are: 1769 those at Haro: 1770 at Villares, with prison, slaughter-house, etc.: 1776 at Villalva del Alcor, and at Mozoncillo; for the city of Toro; for Aldea del Rio, together with the prison, and slaughter-house: 1777 at Burgohondo; of Corral at Almaguer, with its prison, slaughter-house, dwellings, school, and offices: 1778 the consistorial houses at Betanzos; those at Miranda on the Ebro, with its prison, slaughter-house, and other offices: 1779 the *casa de cabildo* and prison at Pravia in Asturias: 1783 that at Burgos, erected by F. Gonzalez de Lara; the court house, primary school, slaughter-house, etc., at Serrada: 1784 the court house at Babilafuente; and at La Seca. *Plazas:* 1773 at Avila: and 1784 at Puerto real, with markets, and police dwellings. *Barracks:* 1768 at Rueda: 1776 at Medina del Campo for a regiment of cavalry, carried out by J. de Sagarvinaga: 1777

infantry barracks in the isle de Leon: 1778 for the fusiliers and royal forest guards at Aravaca, near Madrid. *Hydraulic works:* 1772 a bridge of three arches near Pariza, over the river Ayuda: 1773 the mineral baths called las Caldas or de Priorio, in Asturias: 1775 a public fountain at Atienza; an edifice for the sick at the waters of Trillo; completed 21 Aug. 1782 the aqueduct at PAMPLONA: and 1784 bridge of three arches, near Ayllon, over the river Agüejo.

He enlarged and embellished the palaces of the infante don Luis Boadilla y Arenas, "and designed and directed many other works of this class in all the provinces of Spain, by which he was able to dissipate the reign of errors that had existed in architecture for a century and a half", and thus to be termed "the restorer of Spanish architecture". The above list contains only the works carried out; the numerous *designs* are noticed further by LLAGUNO in the twenty-eight pages devoted to this architect. Amongst his pupils were S. Perez, D. A. Lois Monteagudo, M. Machuca y Vargas, his son Blas B. Rodriguez, and his nephew M. Martin Rodriguez. He died March 1785, and was buried in the church of S. Marcos at Madrid. JOVELLANO, *Eloge di V. R.* 14. 66.

RODRIGUEZ (BLAS BELTRAM), born 3 Feb. 1736 at Cienpozuelos, the eldest son and disciple of V. Rodriguez, who employed him on undertakings of high importance, and after the death of whom he finished the palace of Wervik, and the chapel of the architects in the church of S. Sebastian, both at Madrid, where he designed and carried out many other works. He died 27 Nov. 1794 at Madrid. 66.

RODRIGUEZ (E.); see SANTOS (E. R. DOS).

RODRIGUEZ (MANUEL MARTIN), born 1746 at Madrid, was a nephew and disciple of V. Rodriguez. He went to Rome and other places in Italy; and was appointed to many offices. At Madrid he designed the long edifice in la calle del Turco for a glass warehouse, now a repository of arts and machinery; the house of the royal Spanish academy in la calle de Valverde; the convent of S. Gil near the bridge of Leganitos, now a cavalry barrack; the silversmith's shop called of Martinez, near the pasco del prado; and the well designed royal hydrographical office in la calle de Alcalá; the audiencia at Caceres; the new custom house *cir.* 1785, and other buildings at Malaga; the tabernacle for the cathedral at Salamanca; the *retablo mayor* in that at Lerida; other works projected for the cathedral at Jaen; and for that at Santiago de Cuba in America. He died in 1823. 66.

RODRIGUEZ CARPINTERO (ALFONSO), designed 1415 the university at Salamanca; inscription given in LLAGUNO. 66.

RODRIGUEZ CUMPLIDO (FRANCESCO). An architect of esteem in Andalucia, and *maestro mayor* at Cadiz cathedral; 1535 visited Seville to examine the drawings made by other maestros for continuing the works; M. de Gainza was appointed; and he designed the hospital de la Sangre in that city. 66.

RODULFO (CORRADO), of Germany, son of a sculptor, went to Paris, and then to Rome, where he studied under Bernini; thence to Madrid and to Valencia, where to the cathedral he designed the façade, in three orders, to prevent its being overshadowed by the (detached) large tower (1331-1418 or 1421 by Juan Franch); the statues in the second tier are by Rodulf, who was employed for a fountain, etc., at Barcelona by the archduke afterwards emperor Charles III. He also made a model of the academy of S. Carlos at Valencia. 3. 68.

ROELANDT (LOUIS JOSEPH ADRIEN), born June 1785-7, at Nieuport, was a pupil of C. Percier. He settled at Gand, where 1818-26 he designed the palais de la université (Corinthian), GOETGHEBUER, pl. 117; 1824 three quarters of the octagon at the maison de force or centrale de détention; 1827 a wing to the musée et academie; 1829 the orangery in the jardins des plantes; 1829-32 the entrepôt royal or bonded warehouses and custom house at Antwerp, five floors high, cost £145,000; at Gand, the salle de la Concorde, of marble, given in CASTERMAN, *Parallèle des Maisons*, fol., Paris, 1850-4, pl. 39-42, which work, pl. 31-2 gives the houses, rue pont de Fer (late Gothic): 1835-6 the handsome casino in a large garden; 1837-9 the theatre, saloon, concert and ball rooms, cost 200,000 fr.; 1839-44 the palais de justice, the exchange being below the courts; 1839-55 additions to the beffroi, the painted iron spire being his design not following the original design of XIII cent.; 1841 consolidated the small hôtel de ville at Audenaarden (DALY, iii, 281); and *cir.* 1848, new hôtels de ville at Alost and at Ninove; *cir.* 1853 church at Middelkerke near Nieuport (bad); Sept. 1853-9, church of S. Anne and S. Antoine de Padoue at Gand (bad); where he erected many houses as in the rue d'Anneau (cast iron tracery); also at Grammont (GOETGHEBUER, pl. 100); a gate at Courtrai; buffet d'orgue and altars at church of S. Michel; west tower and octagonal spire to church of Notre Dame at S. Trond; and two churches at S. Nicholas near Gand (Rom. and Gothic). In the library of the Roy. Inst. of British Arch. are engravings of several of the edifices above named, and drawings by Roelandt of the four tall candelabra of brass and copper now in Gand cathedral and formerly belonging to king Charles I of England; *Illustrations*, 1857-58; BUILDER *Journal*, 1857, xv, 670; and there is also a profile of Roelandt in plaster. He died 1863 at Gand, "aged 78". GOETGHEBUER, *Choix des Mons.*, fol., Gand, 1827. ALLGEMEINE BAUZEITUNG, 1838, p. 8.

ROELANDTS; see OVERSTRAETEN (L. VAN).

ROESKILDE (Lat. Rœfontes). A seaport in the island of Seeland, four miles from Copenhagen; founded at end of V cent.; in 980 the residence of king Harald Bloatand; continued a royal residence until XV cent.; one of the earliest episcopal sees, and formerly the most important town, in Denmark. The cathedral dedicated to ; founded 1077 by Canute the holy (1076-86); was erected by the English bishop William and nearly completed when he died 8 May 1074 or 1076; it was consecrated 1084; and suffered in the fires of 1283 and 1443; It is 270 ft. long, 80 ft. wide, and the nave 82 ft. high, and is one of the best of the large Danish churches. The twenty-one carved stalls date 1420; the towers 1443; spires, pulpit and west door (Elizabethan) *temp.* Christian IV; organ 1555, font 1601, baptistery taken down 1772. It is now occupied by the royal tombs. Another church of S. Mary, Vor Frue kirke, is all that remains of twenty-seven churches, (or fourteen churches and six conventual institutions). The church of S. Ibs, XII cent. is now a warehouse and has old frescoes. The tower of S. Laurentii, a good specimen of red brickwork, forms part of the town hall. The palace for the meetings of the provincial states; and a maglekilde or well in an octangular building, are mentioned. BEHRMANN, *Grundleds tel Roes. Domkerks.* etc., 1815. FELDBORG, *Denmark Delineated*, 8vo., London, 1824, pt. 3, p. 61, a small view. WESTWOOD, in ARCHÆOLOGICAL JOURNAL, xvi, 132-8. S. FRIIS, *Descr.*, 1851. FERGUSSON, *Handbook.* COPENHAGEN (p. 140*b*). 28. 50.

ROE STONE; same as OOLITE.

ROFE; see CHARE ROFE.

ROGERS (THOMAS), 1766-7 exhibited at the Society of Artists of Great Britain; 1780-2 designed Clerkenwell sessions house, at a cost of £13,000; RICHARDSON, *New Vitr. Brit.*, fol., London, 1802-8, i, pl. 34-7: and succeeded S. P. Cockerell as clerk of the works at the erection of the house of correction, Coldbath fields, from 10 Dec. 1789 to 13 Oct. 1794; MIDDLETON, *Account*, fol. 1788. He died after 1808.

ROGERS (WILLIAM), was a pupil of C. Beazley. He designed 1842 S. Michael's church, New Park Road, Stockwell; 1845 new infirmary, Lambeth workhouse, Princes Road; 1845-6 All Saints church, Lambeth Lower Marsh, £2,400; ILLUSTRATED LONDON NEWS, viii, 168: 1851-7 S. Paul's church and schools, Westminster Road; CIVIL ENGINEER, ETC., *Journal*, xiv, 125; BUILDER *Journal*, xv, 716; BUILDING NEWS *Journal*, iii, 551: 1849 school house and house of industry, Norwood: 1854 enlarged the London Joint Stock Bank, S. Mildred's Court, Poultry; and 1853 designed schools for All Saints church, York Street, Lambeth. He was district surveyor for the southern division of Lambeth and part of Streatham; surveyor to many

charities and estates; and much engaged in railway compensations and ecclesiastical dilapidations. He died towards the end of 1857.

ROGEZIA (Antonio da), mentioned 14 Sept. 1399 as engaged on the works at Milan cathedral. 27.

ROGGLETED. Scotch term for grooved. Ragalet, Raglin, and Raggle.

ROHAN, Roan, or Roam (Guillen or Guillam de), was 1430 *maestro mayor* at the cathedral at Leon; died Dec. 7, 1431, and was buried in the chapel which he had built, of Esteban Lopez de Saldanha, in the monastery of Sta. Clara at Tordesillas. 85. 66.

ROHAULT DE FLEURY (Hubert père), born 1777 at Paris, was a pupil of J. N. L. Durand; gained 1802 the *grand prix, Projets d'Arch.*, fol. 1806; engraved 1810 a design for an hospital; 1813 appointed architecte de la préfecture de police, and 1820 hon. member of the conseil des bâtimens civils, and 1824 inspector general, etc. At Paris 1821 he designed the butter and fish market; 1822 barracks for the sapeurs pompiers, rue de la Paix, Gourlier, etc., *Choix d'Edifices*, ii, pl. 270: 1823 barracks for gendarmerie, rue de Tournon: 1824-7 barracks rue Mouffetard, erected by — Charle; Gourlier, etc, i, pl. 74-5: and 1825-30 passage du Saumon, rue Montorgueil; 1825 he restored the chapelle des orphelins: 1828 made many designs for the amelioration and completion of the hospitals of S. Louis, la Charité, S. Antoine, Beaujon; the hospices des Orphelins, Incurables (hommes), and S. Pierre: and 1830, etc., designed the Institution de Ste. Perrine, maison de retraite, at Chaillot (Seine); Gourlier, etc., ii, pl. 267-8. He died in 1845. Daly, *Revue Générale*, viii, 254, *Vie* in Revue Mensuelle. 110.

ROHAULT DE FLEURY (Charles), born 1801, son of Hubert, designed 1836 the reservoir, Daly, *Revue Générale*, 1836, i, 97; viii, 425; and published *Musée d'Hist. Nat., serres chaudes, etc.*, fol., Paris, 1844; also *Discours sur C. Percier*, 4to., 1838; *Construction de logements pour les ouvriers*, 4to., 1848; *Etude des différentes modes de chauffage des serres*, Daly, 1849, viii, 254; *Les serres de Liége et de Gand*, viii, 332; and 1851, ix, 203. The following designs are given in Normand, *Paris Moderne*, 4to., Paris, 1849, iii, 1830, écurie des biches au Jardin des Plantes, pl. 54; bergerie, pl. 30; 1835 house at Sceaux (Seine), pl. 61-3; 1840-2 houses at Maisons-Lafitte (Seine et Oise), pl. 112 and 142; and 1842 house and grounds at Egreuil, pl. 15-7. He was living in 1867. *Vie* in Revue Mensuelle.

ROIG (Bartolomé), constructed 1555 the puerta nueva del Mar at the castle at Barcelona; and may have constructed 1559 the literary university which was removed 1718 to Cervera, and the building used as an infantry barracks. 66.

ROILEY (Richard and Gabriel) father and son, of Burton-on-Trent, "tomb makers", agreed 1582 with G. Shirley, esq., to "devise, worke, sett up, and perfectly finish" at Somerton, Oxfordshire, a tomb to Thomas Fermor, of alabaster, 6½ standard ft. long by 4 ft. wide and 5 ft. high, for £40. Archæological Journal, viii, 181-6.

ROJAS (Cristobal de), of Cadiz, where 1588 he was in much esteem; he went to Malaga to examine the works of the choir of that cathedral in company with other architects. He was not the same as the famous captain engineer who wrote on the theory and practice of fortification. 66.

ROLAND'S COLUMN, pillar and statue (Ger. *Ruhlandssaule*). An ancient term signifying court of justice, representing usually the emperor Charlemagne. It was erected at different epochs in nearly all the important towns in Germany, especially in the north, as a mark of imperial authority; as at Magdeburg, Brandenburg, Nordhausen, Halberstadt, Halle, Quedlinburg, Stadelberge, Brême, Hambourg, Wedel in Holstein, Prag, and elsewhere. Also in Swabia and Bavaria. A long description is given in Heideloff, *Ornamentik*, 4to., Nur., 1838-47, pl. 6 at end, p. 31-2. A statue of Roland nearly 20 ft. high, apparently xiv cent., is at Brandenburg.

ROLAND LE VIRLOYS (Charles François), born 2 Oct. 1716 at Paris; became architect to the king of Prussia and to the empress queen Marie Thérèse. He is best known by his *Dictionnaire d'Architecture, Civil, Militaire, et Navale, Antique, Ancien, et Moderne, etc.*, 3 vols., 4to., Paris, 1770-1. In pl. 19 he gives a "French order" designed 1751 by him for the *avant scène* at the theatre at Metz, which is illustrated pl. 1-9. He died 30 May 1772. Lance, *Dict. Biog.* Daly, *Revue Gén.*, vi, 87.

ROLL. The semi-cylindrical piece of wood, about 2 inches wide, fixed on a roof or a flat, in the direction of the length of the sheets of lead, over which the edges of the sheets are dressed so that moisture may be effectually excluded and the lead at the same time be left free to expand and contract. A similar core is used on ridges and hips to receive the lead covers. Hip roll. Ridge roll. Occasionally rolls in lead-covered roofs are formed hollow, without wood cores. The edges of two adjacent sheets are turned up against each other, and the upper edge of one being bent down over the other, the two are bent over together to form a hollow roll: the rolls being secured to the boarding at intervals by lead tacks or tingles. Drip. Lap.

The wood roll for zinc is not round, but tapered, and the angles only rounded; the edges of the adjacent sheets are dressed up against the tapered sides and covered by a separate zinc roll cap well overlapping the turned up edges and secured to the wood roll. Thus the sheets are free to expand and contract, and the roll cap excludes moisture. A. C.

ROLL AND FILLET MOULDING. A convex moulding with a square fillet projecting from its face. It prevails in mediæval architecture. 17. 19.

ROLLED IRON. Wrought iron rolled out from the lump into a plate, sheet, beam, or girder; also flitch plate; bars, angle, tee, channel, and z iron; convex, hexagon, and many other forms. Flitch. Plate iron. Iron (p. 46). Girder.

Cold rolling imparts a strength of 110,000 lbs. per sq. in., when before it bore but 24,000 lbs; exp. at Pittsburgh; Builder *Journal*, 1861, xix, 502.

Rolled wrought or malleable iron joists and girders have of late years taken the place of cast iron in the construction of buildings, especially since 1866, when messrs. W. and T. Phillips introduced beams of various forms and strengths scarcely expected from the size, owing in some degree to the web being taken into account in estimating for strength; Engineering *Journal*, 2 March 1866, p. 139. Phillips, *Rolled Iron Joists, etc.*, 3rd edit., 1868; *Architectural Iron Construction, Beams and Girders*, 8vo., 1870. Building News *Journal*, 1868, xv, 389: Economical limits to the use of rolled girders, 1874, xxvii, 504: 1877, xxxii, 401, 427. Fox and Barrett's system; strength of wrought or rolled iron joists, Builder *Journal*, 1851, ix, 757: Iron beam plates, viii, 609: Rolled iron in Exhibition of 1862. xx, 583.

Rolled iron is usually made from 3 ins. to 12 ins. deep, varying 12 ft. to 30 ft.; also 5 ins. to 12 ins. with top and bottom flanges up to 5 ins. wide, rolled to 28 ft. (1861), and to 30 ft. (later); and can be produced if required 17¾ ins. deep by 6⅝ ins. by ⅞ weighing 77 lbs. per foot up to 46 ft. long (1881). The Saarbrucken Ironworks company (1881) give a section 21¾ ins. by 8 ins., weighing 112 lbs. per foot for spans of 16 ft. up to 40 ft.; the safe load being for those spans 50 tons and 20 tons.

A *rolled* rod 20 ft. long and 7 ins. diam., and a *drawn* tube 12 ft. long and 7 in. diam. were in Exhibition of 1851.

ROLLED ROUGH PLATE GLASS, made by Hartley of Sunderland. Glass, p. 47.

ROLLER BLIND. Patent releasing spring and roller blind. 20 Feb. 1872. Building News *Journal*, 1872, xxiii, 233.

ROLLESTON (Robert), clerk of the king's works within the palace at Westminster and tower of London, is noticed 1411, 12 Henry IV, as engaged on a large new gate on the west side; repairs, etc., to lodge at Kenyngton park; scaffolding for the coronation of king Henry V in the abbey, and new works at both places; 1420-1 as 'clerk of the king's great wardrobe' pro-

viding apparel for king James of Scotland to go to France; repairing, etc., the king's row barge for use on the Seine; and 1423 hearse, etc., for the burial of the duchess of Bedford in S. Paul's cathedral. DEVON, *Issues of the Exchequer*, 4to., London, 1837, p. 317, 319, 321, 362, 367, 419.

ROLLING MACHINE. An implement for making brass mouldings as in fenders; and the brass work in grates. VICE.

ROLLING MILL; see PUG MILL. It consists of a pair or pairs of horizontal cylinders running near together, between which the clay is crushed, in brickmaking. BUILDER *Journal*, 1856, xiv, 443; 454.

ROLL MOLDING. A convex molding as fig. c, EDGE MOLDING. BOLTEL. PALEY, Gothic Moldings, 1865.

ROLL RIBBING. Another term for RIDGING of slate.

ROLL ROOFING TILE and Bridgewater double roll tile; see TILE. PANTILE.

ROMA. The ancient name of ROME.

ROMAIN (FRANÇOIS); see ROMANO (F.).

ROMAIN, LE: see LENOIR (N.).

ROMAN (GIOVANNI), executed 1719 the chapel and first portion of La Granja de S. Ildefonso, near Madrid, under T. Ardemans (succeeded by A. Procaccini).

ROMAN ARCHITECTURE. An accurate knowledge of Roman architecture dates only from the beginning of the empire (*cir.* 30 B.C.), and, at that time, no doubt, it took the definite form by which it has since been known. But Greek forms had, doubtless, been used to some extent at an earlier date, much as Norman work in England had been used before the Conquest. In the formation of the Roman style all the forms of Grecian art were adopted, together with the arch and the dome (remains, probably, of an earlier form of art); but all so altered as to be recognised as Roman. The Doric order of the Greeks was lightened, and received a base; but this order was little used, nor was its more simple form, the Tuscan. A new order, the Composite, was a union of the Ionic volute with the Corinthian leaves; but the Romans seem to have taken but little pride in their invention, as it was seldom used by them. The order which was as great a favourite with the Romans as was the Doric with the Greeks, was the Corinthian; some of the examples are of great beauty, and although in a mere written description their forms would appear to be strikingly like the Greek, as seen in the Choragium of Lysicrates, and at the temples at Bassæ and Branchidæ, yet the actual difference between these and the Roman Corinthian is apparent at a glance. The same supposed resemblance, but actual difference, is apparent in the capital of the Ionic order, and in every other detail —each taken from Greek art, but so altered as to shew that it was the work of the Roman and none other. The delicate cyma recta of the Greek Ionic and the carefully outlined ovolo of its Doric were replaced by coarse forms struck with the compasses. The somewhat stiff, though elegant, conventional foliage, the sharp cutting of which was followed by the Byzantines and by the Normans, was changed for the more rounded and flowing forms, since adopted in the Renaissance, and more nearly copied from nature. In the early period of the style, the arch was used sparingly in the exterior, and the well known columnar form of the Grecian temple was copied by the Romans in every part of their dominions. But the circular plan, so little used by the Greeks that the Choragium of Lysicrates and the Philopœan at Olympia are about the only examples of it known, was adopted by the Romans in many of their temples, and was in constant use in their public buildings. Very early, too, in the style, the adoption of the arch largely modified the internal arrangement of their columnar porticos, as is strikingly seen in the Pantheon. The time from Augustus to Trajan is usually considered as embracing the finest period of Roman art, which appears to have suddenly arrived at perfection in the time of Augustus, declined for a time, revived under the Antonines, and then gradually sank until it disappeared before the Byzantine artists. T. H. L.

ARCHITECT. ARCHITECTURE OF ITALY. GRECO-ROMAN. ITALIAN (55). LOMBARD. ROMANESQUE. See also each country; the Histories, etc.

VITRUVIUS, *De Re Architectura*. CANINA, *L'Arch. Antica*, fol., 1834-43: BECKER, *Gallus, or Roman Scenes of time of Augustus*, transl. by METCALFE, 8vo., 1849: for Pliny's House, see C. PLINIUS SECUNDUS: MAZOIS, *Le Palais de Scaurus*, 8vo., Paris, 1819: UGGERI, *Intorno agli edifici di Trajano, cir.* 1800: LIGORIO E CONTINI, *Pianta della villa Tiburtina di Adriano*, fol., Rome, 1751: ADAM, *Palace of Diocletian at Spalatro*, fol., 1764: DEZOBRY, *Rome au siècle d'Auguste*, 4 vols., 8vo., Paris, 1846: BENDER, *Rom und Romisches Leben in Alterthum*, 8vo., Tub., 1880. FUSS, *Roman Antiquities*, transl., 8vo., 1840: GODWIN, *Romanæ Hist. Anthologia*, 8vo., 1620: PIRANESI, *Della Magnificenza ed cont. di Romani*, fol. 1761: SMITH, *Dictionary of Greek and Roman Antiquities*, 1842: VASI ET VENUTI, *Pitture belle veduti d'Italia*, 4to., 1761: RING, *Etablissements Romaines du Rhin et Danube*, 8vo., 1853: GAILHABAUD, *Monuments Anciens et Modernes*, 4to., Paris, 1850: WOOD, *Ruins of Baalbec and Palmyra*, fol., 1753-57: AKERMAN, *Arch. Index, serving as a Guide to the Antiq. of the Celtic, Roman, Brit., and Saxon periods*, 8vo., 1849. 1. 2. 11. 14. 23. 25.

GIBBON, *Decline and Fall*, 4to., London, 1776-81; 8vo., London, 1853, i, 58; ii, 320; abr. by W. Smith, 1857: BROMLEY, *History of Fine Arts*, 4to., London, 1793-5, ii, 138.

DONALDSON, *Arch. Numismatica*, 8vo., London, 1859: COOKE, *Medallic History of Imp. Rome*, 61 pl., 4to., 1781: GRUTERUS, *Inscriptiones ant. totius Orbis R.*, fol., Amst., 1707.

ROMAN CEMENT, also called Parker's, and Sheppey, cement. A natural calcareous cement introduced 1796 by messrs. Parker and Wyatt, being manufactured from the septaria found at Harwich and Isle of Sheppey; but in 1840 it was stated that the stone from the beach, where the nodules were first found, "has since nearly disappeared—and the genuine Sheppey cement is now almost only a name". "James Wyatt first introduced into this country a stucco called Roman cement; superior in every way to the oil cement of the Adams, which has perished to the core, while the induration of Mr. Wyatt's is perfect to this hour (1827)"; as applied to his own house in Portland and Langham Places; LEEDS AND SHEPHERD, *London in XIX cent.*, 4to., 1827, i, 94. ATKINSON'S; CALCAREOUS; MEDINA; and PARKER'S, CEMENT. According to an analysis made about 1823-4 by Berthier, the compound parts of Parker's cement were:—

Carbonate of Lime	·647	Clay Silica	·180
,, Magnesia ...	·005	,, Alumina	·066
,, Iron	·070	Water	·043
,, Manganese ...	·019		1.000

He was of opinion that with one part of common clay and two parts and a half of chalk, a very good hydraulic lime may be made, which will act as speedily as Parker's cement. He concluded, from many experiments, that a limestone containing six per cent. of clay, affords mortar perceptibly hydraulic; from 15 to 20 per cent. is very hydraulic; and when from 25 to 30, it set almost instantly, like Roman cement. Tickell of Birmingham, made a Roman cement, as described in GILL, *Technical Repository*, 8vo., 1821-3, i, 434; ii, 400; iii, 111. Prussia in 1851 sent over a Roman cement, being an argillaceous carbonate of lime with magnesia; and a Roman cement stone from New Zealand, is described in *Juror's Reports*, 1851 Exhibition, p. 15.

Roman cement, though about two-thirds the cost of Portland cement, was only about one-third its strength, and therefore about double the cost when measured by strength; besides it was very ill adapted for being mixed with sand; GRANT, *Exper. on the Strength of Cement, etc.*, 8vo., London, 1875. BUILDER *Journal*, 1845, iii, 160: iv, 559, 561: 1851, ix, 603: xv, 648: 1878, xxxvi, 1048. CIVIL ENGINEER, ETC., *Journal*, 1838, i, 318, gives an analysis; 340: ix, 34: x, 54: xxix, 7. BUILDING NEWS *Journal*, 1856, ii, 539. PASLEY, *Limes, etc.*, p. 20; 42. INST. OF CIVIL ENGINEERS, *Proceedings*, v, 35. DONALDSON, *Stucco, etc.*, p. 177. REID, *Concrete, etc.*, 8vo., 1869. 1.

ROMANESQUE ARCHITECTURE. A term proposed by GUNN of Norfolk, as noticed by WHEWELL, *German Churches*, 8vo., 1842, 3rd edit., 48. The name given to the architecture which prevailed after the decline of the Roman Empire (D'AGINCOURT, vi cent., SELVATICO, vii cent., and CORDERO, viii cent., as in LOMBARD, p. 125) from the reign of Constantine (306-337) until the use of the pointed arch, and was from Lombardy introduced into France, and subsequently, variously modified, proceeded into Normandy and England (NORMAN). The term Byzantine Lombard has also been employed for the style. The Romanesque of Italy, see LOMBARD; and ITALIAN ARCHITECTURE, p. 55. BYZANTINE. LATIN. ROUND ARCH STYLE.

After the destruction of the Lombard power by Charlemagne in 774, began that tendancy to Orientalism which formed during his reign (768-814) the transition (seen perhaps in the old round cathedral at Brescia begun 780) from Roman to Romanesque, otherwise called Lombard art. This Carlovingian transition is sometimes connected with the works of the Lombards, those being counted as a stage of Roman art, at others with the style of the IX and X centuries to which, the earliest form of the Romanesque, it perhaps properly belongs. This Romanesque style was never entirely superseded, for during the prevalence of the so-called mediæval styles in Italy, a homely imitation of Roman or classic architecture had always subsisted, evidenced every now and then in some single example, and then again subsiding, but it had not been studied until Brunellesco arose. During the three centuries which elapsed from the age of Augustus (31 B.C. to 14 A.D.) to that of Constantine (306), the Roman form of architecture prevailed from the shores of the Atlantic to the valley of the Euphrates; and all round the shores of the Mediterranean, with the slight exception of Egypt, which for some time retained her own style. It was, however, a period of transition, and before Constantine assumed the purple, a vast change had come over the style. It had departed more and more from the columnar arrangement of the Greeks, in the place of which arches and domical forms had gradually come into use; and a new architecture was almost completely invented before the change of religion seemed to demand it. During the next two centuries from the time of Constantine to that of Justinian (527-65) a style prevailed which may properly be called the Romanesque or Christian Roman, differing but slightly from the Pagan Roman which preceded it. We know that the circular temple of the Minerva Medica, that in Diocletian's palace at Spalatro, the baptistery of Constantine at Rome, the church which he built over the Holy Sepulchre at Jerusalem, and the round churches at Ravenna and elsewhere, are all very nearly identical in style; and that the church at Bethlehem, and the basilicas of Rome and Ravenna, are in like manner modifications of the basilicas of Pagan Rome. From 500 the same style continued to be practised in Rome itself during nearly the whole of the middle ages; and in Florence, Pisa, and generally along the western shores of Italy, until a later period. 1. The Latin romanesque or Christianized Roman. In Lombardy and in all those parts of Europe to which the Indo-Germanic barbarians penetrated, and which they subdued, the romanesque was superseded by the barbarian styles, properly called Gothic, which entirely revolutionized the art, giving it new vigour and greater variety and beauty than either the Roman or Romanesque was capable of attaining. 2. The Gothic, or that style which was practised by the Teutonic and Celtic races wherever they predominated in Europe, *i.e.* LOMBARD ROMANESQUE. 3. Owing to the paucity of examples, and the imperfect mode in which those which do exist have hitherto been examined, it is not so easy to define exactly the changes which took place in this style in the East. BYZANTINE.

Although frequently much altered, Northern Italy abounds in magnificent specimens of the Romanesque style, a variety of which is familiarly known amongst us as Norman. The cathedrals of Pisa, Lucca, Verona, Parma, Borgo S. Donino, and Modena, and the conventual churches of S. Zeno at Verona, S. Miniato at Florence, and S. Michele at Pavia, are peculiarly valuable. Most of the larger Lombard churches are interesting from the symbolical and hieroglyphical sculptures of the façades. 1. 2. 6.

Publications relating to this style specially. MURATORI, *Medii Œvi*, ii, 351-6. DARTEIN, *Etudes sur l'Arch. Lombarde*, 1866-7. SAVILE, *Rer. Angl. Script.*, iii, 102. TIRABOSCHI, *Storia della Let. Ital.*, 8vo., Milan, 1823, iii, 217. INKERSLEY, *Enquiry—R. etc., in France*, 8vo., Lond., 1850. WARING, in CIVIL ENGINEER, *etc. Journal*, 1861, xxiv, 114, 139. BUILDING NEWS *Journal*, 1874, xxvi, 112, 195, 244, 470, 491-4, 607, 661: xxvii, 80, 790: 1872, xxiii, 255-8, 357. BUILDER *Journal*, 1867, xxv, 907: xix, 334: xxxiv, 432. WHEWELL, *German Churches*, 8vo., London, 1842, p. 280-1. WEBB, *Continental Ecclesiology*, 8vo., London, 1848. SCOTT, *Lectures*, 8vo., 1879, i and ii, 12, 74-5. OKELEY, *Development of Christian Art in Italy*, 8vo., Lond., 1860, p. 8, 14, 30. HUBSCH, *Altchristlichen Kirchen*, fol., Carls., 1858-61.

Germany. BUILDING NEWS *Journal*, vi, 213. HILDESHEIM. KALLENBACH, *Dogmatisch-lit. symb. etc. der Kirch. Bauk.*, 8vo., Halle, 1857. MÖLLER, *Deutschen Baukunst des Mittelalters*, 2 vols., Darms., 1821, and Suppl. by GLADBACH, fol. (1851). ALLGEMEINE BAUZEITUNG, 1845, pl. 695-701, *R. to the ogival.*

Italy, in various parts. SELVATICO, *Sulla Arch., etc.*, 8vo., Venice, 1847, p. 66 and 72-82. His object is to show that the *romano-barbaro* or romanesque, called by him and HOPE, Lombard, arose in the VIII or IX cent.; and alleges the atrio of S. Ambrogio at Milan, dated before 881 (say 875): CORDERO raises no objection. GALLY KNIGHT, *Ecclesiastical Architecture in Italy*, fol., London, 1842-44. "Pisa, the glory of Romanesque", FREEMAN, *Hist. Sketches*, 8vo., 1876, p. 113. Pisa (Rom.) and Pistoia and Lucca (Tuscan Rom.) in WEBB, *Cont. Ecclesiology*, 8vo., 1848, p, 364. S. Giovanni Evangelista at Pistoia, "the most graceful and grand piece of Rom. work in North Italy"; RUSKIN, quoted in ECCLESIOLOGIST *Journal*, 1868, xxvi, 327.

France. All works in South France date 1160-70 to 1180, the provençal, see PROVENCE; FREEMAN, *Hist. of Arch.*, 8vo., London, 1848, p. 219. FRENCH ARCHITECTURE. CAEN. ALLG. BAUZEITUNG, 1860, pl. 353-70. R. church and crypt, at Cruas, NODIER ET TAYLOR (Languedoc), ii, pt. 2. REVOIL, *Arch. Romaine du Midi de la France*, fol., Paris, 1865-6.

England, etc. NORMAN; IRISH ARCHITECTURE.

ROMAN FOOT; see FOOT.

ROMAN GARDEN. CATO, *De Re rustica.* VIRGIL. PLINY. LOUDON, *Villa, etc., Architecture.*

ROMAN LAKE. A variety of Scarlet Lake.

ROMANO (C.); see CASSANDRO and PITUENZA (F. DE).

ROMANO (FRANCESCO), better known as François Roman, le frère Romain, and il frate Romano, born 1646 at Gand, became 1675 a Dominican friar, and a clever hydraulic engineer. By order of the States of Holland he assisted 1680-4 to rebuild an arch of the bridge at Maestricht (the whole bridge is also stated of nine arches to which the date of 1698-1714 is now assigned). He 1700 also vaulted with timber the nave 53 ft. span between the piers, to the Dominican church built 1240-75 at Gand, pulled down 1861 (GWILT, *Ency. of Arch.*, 1876, p. 241); and probably many other works. King Louis XIV invited him to Paris to complete 1688 the pont royal commenced 1684-5 by J. H. Mansart; J. Gabriel, jun. worked under him. The success of this difficult work procured him the offices of inspecteur général des ponts et chaussées, and 1695 of architecte des bâtimens et domaine du roi dans la généralité de Paris. He died 7th January 1735 at Paris, aged 89, and was buried in the church (now called) S. Thomas d'Aquin. BAYLE (?), *Dict. Hist. Crit., et Bibl.* (new edit., 8vo., Paris, 1820 ?), vii, 153. MARCHESE, *Lives*, 8vo., Dublin, 1852, ii, 322-3. LANCE, *Dict. Biog.*, 1874. REVUE DE BRUXELLES, 8vo., Brux., 1837, iv, 15. LAMBERT, *Hist. Litt.*, 4to., Paris, 1751, iii, 125-9. 3. 5. 29.

ROMANO (GIULIO); see PIPPI (G.).

ROMAN OCHRE. A colour rather deeper and more powerful than the Stone and Oxford ochres, and the three are often confounded. R 9.

ROMAN ORDER. Another and old name for the COMPOSITE ORDER. 4. 11.

ROMANS (JACOBUS), also a sculptor, flourished about 1690. He was architect to king William III of Holland, for whom he designed the fine arches erected on the occasion of his arrival at the Hague; and for whom he completed in 1696 the castle, begun 1536, "a costly palace unequalled in the Netherlands". 24.

ROMAN SCHOOL; see ITALIAN STYLE OF ARCHITECTURE. 1.

ROMAN VAULTING. The term given by WHEWELL, *German Churches*, 8vo., Cambridge, 1835, p. 37, to vaulting where the length and breadth are equal, such a compartment being exactly vaulted over by means of semi-circular vaults intersecting each other and strengthened by semi-circular arches. CHOISY, *L'Art de bâtir chez des Romains*, fol., Paris, 1874.

ROMAN WHITE OIL PAINT: also called Hutchinson, Willement, and Hawthorn's newly discovered healthy paint, denominated Roman white; manufactured in 1817 at No. 22 Little Cadogan Place, Sloane Square. The usual Roman white is of the purest white colour, but differs from blanc d'argent only in the warm flesh colour of the external surface of the large square masses in which it is usually prepared. It is not generally found in shops. 9.

ROME (Anc. ROMA). One of the most celebrated of ancient cities, being founded on the Palatine hill by Romulus, B.C. 753, situated chiefly on the left bank of the river Tiber, and now the capital of Italy. New walls about five miles in circuit enclosing the whole of the enlarged city were begun by Tarquinius Priscus and finished by Servius Tullius about 570 B.C.

The existing walls, by Honorius A.D. 402, built of brick with patches of stonework, and having numerous towers, have an average height of about 50 ft. and are pierced by sixteen gates, four of which are closed, and form a very irregular polygon with a perimeter of nearly fifteen miles. That portion of about three miles, on the left bank, is ancient, and following the same line as that traced by Aurelian in 271 must in many parts be identical though difficult to be traced. The enclosure of the Borgo was effected 850 by pope Leo IV. Over the river were anciently eight bridges; vestiges of all still exist, but only four are now entire and in use: these are, pons Ælius now ponte S. Angelo, pons Janiculanus now ponte Sisto, pons Fabricius now ponte di quattro Capi, and pons Cestius or Gratianus now ponte S. Bartolommeo. The population under the empire has been calculated at from one to three millions, the former is perhaps nearer the fact; the census Dec. 1881 showed 300,000 persons.

LIST No. 1.—ROMAN ARCHITECTS (Chronologically from *cir.* 400 B.C.)

Constantius
[illegible]
Cossutius
Hermodorus
Caius Mutius
Batrachus
Saurus
Dexiphanes
Sostratus
Valerius
[illegible]
C. Posthumius
Cocceius Auctus
Fussitius or Fufitius
Messidius
Philoxenus
Cluatius
Chrysippus
Valerius
M. Vitruvius Pollio
Califurnius
Numisius
Deinocharès or Deinocrates
[illegible] A.D.
S. Pompeius Agasius
Celer
Severus
Rabirius
Tychicus
Mustius
J. Frontinus
Vettius Apollodorus
C. J. Lacer
C. Plinius secundus
Detrianus
Cissonius
Antoninus
Alypius
Cyriades
Aloisius
Aphrodisias
Auxentius
Anthemius?
Isidorus?
Chryses Alexandrinus?
Ætherius?
Dates unknown.
L. Antius Palatina
Apuleius
M. Valerius Artema
Cornelius
Diphilus
C. Sævius Lupus
Philippus
Postumius Pollio
C. Julius Posphorus
Varrius
Vitalis
Vitellinus
Vitruvius Cerdo
Volacinus

700 architects in Rome at the beginning of IV cent.: 500 at the beginning of VI cent.: Charlemagne (768–813) sent architects to Rome; DUCHESNE, *Hist. Franc. Script.*, fol., Paris, 1636-49, iii, 780.

LIST No. 2.—NAMES of ARCHITECTS deceased prior to January 1882, who have been engaged in Rome on works of public utility, and of whom biographies are given in this work. Those to whose names the mark * is attached, have lately died.

B. Agnolo
N. Albergati
L. B. Alberti
G. Alessi
A. Algardi
G. Alghisi
*E. Alvino
P. Amati
B. Ammanato
C. Arcucci
L. Arigucci
A. Asprucci
N. di Baccio Bigio
G. Barozzi (Vignola)
A. de Battistis
C. da Bergamo
P. and G. L. Bernini
P. Berrettini
C. Bisaccheri
J. Bonomi
G. Borgonzoni
F. Borromino
D. Bramante. See Lazzari
M. A. Buonarotti
*G. P. Campana
M. da Canepina
*L. Canina
A. Cannevari
A. Casoni
D. Castella
L. Cigoli
G. Cioli
*A. Cipolla
— [illegible]
M. Davido
A. Derset
C. de Dominicis
G. del Duca
C. Fansaga
F. Ferrari
C. Ferri
G. Fiammingo (Vansanzio)
*C. Folchi
C. Fontana
D. Fontana
G. Fontana
[illegible]
F. Fuga
A. Galilei
Fer. and Franc. Galli Bibiena
A. and G. Giamberti da San Gallo
G. Giocondo
A. del Grande
F. and V. della Greca
D. Gregorini
F. Grimaldi
G. and G. Guerra
F. Juvara or Ivara
A. Labacco
D. Lazzari
— [illegible]
P. Ligorio
A. and N. Lippi
C. Lombardo
M. Lunghi
M. Lunghi
O. Lunghi
C. Maderno
[illegible]
G. A. and P. Maggi
G. da Majano
— Maratti.
C. Marchione
T. di Marchisi
P. Maroscelli
P. Marucelli
O. Mascherino
F. Massari
T. Mattei
F. Mazois
G. Mazzoni
J. Melighino
G. B. Menicucci
J. le Mercier
M. Michelozzi
C. Milano
A. Montecavallo
C. Murena
G. B. Muti
G. Muziano
G. B. Nolli
P. P. Olivieri
— [illegible]
D. Paganelli
L. Paglia
P. A. Paris Passalacqua
D. Peparelli
F. Peperelli
B. Peruzzi
N. Piccione
A. Piccone da San Gallo
B. Pintelli
G. Pippi (Romano)
G. B. Piranesi
A. and S. Pollajuolo
G. Pontelli
F. Ponzio
P. Posi
G. D. Porta
A. Pozzo
F. F. Pozzoni
C. Quadri
[illegible]
G. and C. Rainaldi
E. Rodrigues
R. Rosati
A. and B. Rossellini
G. A. and M. de Rossi, and others
A. de Rubeis
N. Salvi
G. de Sanctis
San Gallo. See Giamberti and Piccone
J. Sansovino (Tatti)
R. Sanzio
G. Sardi
G. A. Serratini
M. A. Simonetti
G. Soria
A. Specchi
J. Tatti Sansovino
G. Teodoli
A. Torrona
G. Valadier
G. Vasari
L. Vanvitelli
G. Vecchi
J. Venance
Vignola, see G. [illegible]
F. da Volterra
D. Zampieri (Domenichino)

VASARI, *Vite*, 8vo., Bol., 1647; 8vo., Fir., 1822; 8vo., London, 1850: BELLORI, *Vite Pit., Scul., ed Arch.*, 4to., 1672: POZZO, *Vite de' più celebri Arch. R.*, 4to., Verona, 1718: PASCOLI, *Vite de P., S., ed Arch. Moderni*, 4to., Rome, 1730-36: PASSERI, *Vite de P., S., ed A., in Roma 1641 al 1673*, 4to., 1772: MILIZIA, *Memorie degli Architetti Ant. e Mod.*, 8vo., Bass., 1785: QUATREMÈRE DE QUINCY, *Vie des plus célèbres Arch.*, 2 vols., 8vo., Paris, 1830: BIOGRAPHIA ILLUST. ITAL., 8vo., Ven., 1834: TIPALDO, *Biog. degli Italiani*, 8vo., Ven., 1834-45. 3. 31. 39. 54. 59. 68. 73. 112. 113.

LIST No. 3.—HISTORIES AND DESCRIPTIONS.

MARLIANI, *Topographia*, fol., Rome, 1544; 1588: LIGORIO, *Libro delle Ant. di R.*, etc., 8vo., 1553: GAMUCCI, *Libri quattro dell' Ant.*, 4to., Venice, 1565; repr. with additions by PORCACCHI, 8vo., 1568; 1580: BOISSARDI AND BRY, *Roma Urbis Topog. et Antiq.*, fol., 1597; 1602: TOTTI, *Ritratto di R. antica*, 8vo., 1627; 1633; and *Ritratto di R. moderna*, 8vo., 1638: DIAZ VARA CALDERON, *Grandezas y Marevillas de R.*, fol., Madrid, 1673: TITI, *Ammaestramento utile, etc.*, 12mo., 1686; 1721: and *Studio di pittura, etc.*, 12mo., 1674; 1708: ACTON, *New Journal of Italy*, 12mo., London, 1691; 1794.

NARDINI, *R. antica*, 4to., 1704; and by NIBBY, 8vo., 1818-20: DONATUS, *R. Vetus ac recens utriusque Ædificiis*, 4to., 1725: *Roma antiq. et moderna*, 3 vols., 8vo., 1739; 1745; 1750: ROISECO, *R. ampliata e rinovata, des. della città di R.*, 8vo., 1739: ROSSINI, *Il Mercurio Errante delle Grandezze di R.*, 12mo., 1750: VENUTI, *Descr. topog. del antica di R.*, 4to., 1760; and *Roma moderna*, 12mo., 1767; 1803: TITI, *Descrizione*, 8vo., 1763: GIBBON, *Decline and Fall, etc.*, 4to., London, 1776-81; 1853; abr. by W. Smith, 1857: RICHARDSON, *Treatise on Arch. and Observ. on Antiq. of R.*, fol., 1787: SALMON, *Hist. descr. of ancient and modern R.*, 8vo., London, 1798; 1816.

GUATTANI, *Roma descritta ed illust.*, 4to., 1805: UGGERI, *Edifizi, antichi di R. e dei contorni*, 5 vols., 4to., 1800, etc.; and *Edifices de R. antique, et détails des matériaux*, 2 vols., fol., 1809: LUMISDEN, *Remarks on Antiq. of R., etc.*, 4to., 1812: CASSAS E BENCE,

Itin. pitt. de R., 1813: Vasi, *Itinéraire de R. ant. et mod.*, 12mo., 1816: Eaton (née Waldie), *Rome in the Nineteenth Century*, 8vo., 4th edit., 1817: Weston, *Enchiridion Romæ, etc.*, 12mo., 1819; 1827: Fea, *Descr. di R.*, 1821; 1825: Burton, *Descr. of the Antiq., etc.*, 8vo., Oxford, 1821; 1828: Thomas, *Un An à Rome et dans ses Environs*, 72 pl., fol., Paris, 1823: Nibby and Vasi, *Itin. istruttivo di R., etc.*, 2 vols., 1824; amp. da Valentini, 1850: Woods, *Letters of an Architect*, 4to., London, 1828: Rossini, *I sette colli di R., etc.*, fol., 1828-9: Rossini, *I sette colli di R. antica e moderna*, fol., 1828-9: Starke, *Travels in Europe*, 12mo., London, 1830; 1839; 8th edit., 12mo., Paris, 1833: Malden, Donne, and Merivale, *Hist. of R.* (Lib. of Useful Know.), 8vo., London, 1830-43: Platner, Bunsen, Gerhard, und Köstel, *Beschreibung der stadt R.*, Stutt., 1830-42: Burgess, *Top. and antiq., including recent discoveries*, 8vo., 1831: Gell, *Topog. of R. and its vicinity*, 4to., 1834; 1846: Lardner, *Hist. of R.*, 8vo., London, 1834-5: Canina, *Espos. Topog. di R. antica*, fol., 1842: Pistolesi, *R. e suoi contorni*, 1844: Clinton, *Fasti Romani, etc.*, 2 vols., 4to., Oxford, 1845-50: Niebuhr, *Hist. of R.*, transl. by Hare and Thirlwall, 8vo., 1847-51: Smith, *Dict. of Ancient Geog.*, 8vo., 1848: Head, *Rome*, 3 vols., 8vo., 1849.

Ramsay, *Manual of R. Antiq.*, 8vo., London, 1851: Braun, *Ruins and Museums of R.*, 12mo., Bruns., 1854: Westropp, *Travellers' Art Companion*, 8vo., London, 1868: Gori and Parker, *Ancient Streets and Roads*, 8vo., 1869: Burn, *Rome and the Campagna*, 4to., London, 1871: Jordan, *Top. der stadt Rom.*, Berlin, 1871: Wey, *Rome*, transl. by Story, 4to., 1872: Parker, *Archæology of Rome*, 8vo., Oxford, 1876, etc.: Murray, *Handbook to R.*, 8vo., London, 1881.

Comolli, *Bibl. storia critica dell' Arch.*, 4 vols., 4to., Rome, 1788-92: Bertocci, *Repertorio Bibliographico—nel secolo xix*, 8vo., Rome, 1876 (in progress): *Bibliografia Romana, Not. della vita, etc.*, 8vo., Rome, 1880 (in progress).

List No. 4.—Maps and Plans.

Calvi, *Ant. Romæ Simul.*, fol., 23 leaves, Rome, 1532.

Bellori, *Fragmenta Vestigii Veteris Romæ*, fol., 1673; 1764, 4th edit.: Piranesi, *Lapides Capitolini*, fol., 1761.

Calderon, *Grandezas*, fol., Madrid, 1673: Nolli, *Nuova pianta di R.*, fol., Rome, 1748: *La ville de R., ou descr. etc., avec deux plans généraux et ceux des* 14 *quartiers*, 12mo. 1783: Society for the Diffusion of Useful Knowledge, No. 203 Ancient, and No. 204 Modern, fol. *cir.* 1830: Letarouilly, *Rome Moderne*, fol., Paris, 1840-60: Gell, *Top. of Rome and its vicinity*, 2 vols., 8vo., 1834: Canina, *Indicazione top. di R. Ant.*, 8vo., Rome, 1850: Cookesley, *Explan. Index to Map of Ancient R.*, 8vo., 1851: Taylor, *Antiq.*, new edit., fol., 1874: Murray, *Handbook to Rome*, 8vo., 1881.

List No. 5. -Books of Views only.

Calvi, *Antiquæ Romæ Simulachrum*, 23 leaves, fol., R., 1532: Fulvio, *L'Antichità di R.*, 12mo., 1543; 1588: Fauno, *delle Ant. della città*, 16mo., Venice, 1548; 1552: Bernardo, *Le Ant. della città di R.*, 8vo., 1565; 1569: Androuet de Cerceau, *Livre des Edifices Ant. Rom.*, fol., 1584.

Sadeler, *Vestigie dell' Ant. di R., etc.*, fol., 1606; re-engr. by Rossi (1660): Laurus, *Ant. Urbis splendor*, 166 pl., fol., 1612: Maggius, *Ædificia et Ruinæ Romæ*, 4to., 1618: Marcucci, *Grandezza della città di R., ant. e mod.*, 4to., 1625: Fabricius, *Roma Illust., sive Ant. Rom. brev.*, 12mo., Amsterdam, 1657: Ferrerio, Falda, e Rossi, *Il Nuovo Teatro delle fabriche, etc., di R. Mod.*, 142 pl., fol., 1665-99: Ciampini, *R. vetera monumenta*, fol., 1690-99: Rubeis, *Urbis Romæ sciog. ex Ant. mon.*, fol., 1693: Rubeis, *Romanæ Mon. magnitudinis, etc.*, fol., 1699.

Overbeke, *Reliquæ ant. Urbis R.*, fol., 1703; 1707; 1763: Deseine, *R. anc. e mod.*, 8vo., 1713: Calvi, *Vedute delle Feste di R.*, 54 pl., fol., 1722-51: Samber, *R. illust.*, 12mo., London, 1722: Borioni, *Collect. Antiq. Rom.*, fol., 1736: Ficoroni, *Vestigia di R. ant.*, 4to., 1746: Cipriani, *Mon. di fabbriche antiche, anc. e mod.*, 180 pl., 1747; 1796; 1817: Vasi, *Della magnificenza di R. ant. e mod.*, 1747-61: Piranesi, *Tempii Antichi*, fol., 1748; 1780: Silvestre, *Recueil de Vues des plus belles villes, etc.*, fol., 1750: Piranesi, *Le Antichità Romane*, fol., 1756; suppl. 1785: Piranesi, *Vedute di R.*, fol., 1757: Piranesi, *Teatro delle fabb. et edif. in prosp. di R. mod.*, fol.: Barbault, *Les plus beaux Edifices mod.*, fol., 1763: Canale, *Ichno. veteris R.*, fol., 1764: Losi, *Il nuovo Splendore*, fol., 1773: Barbault, *Les plus beaux Restes des ant. Rom.*, fol., 1775: Cassini, *Nuova raccolta delle migliori Vedute, ant. e mod.*, 80 pl., fol, 1779: Vasi, *Raccolta delle Vedute di belle Mont. ant.*, fol., 1780: Guattini, *Mon. ant. inediti, etc.*, 4to., 1784: Pronti, *Nuova raccolta di* 100 *ved. ant. e mod.*, 4to., 1793: Merigot, *Ant. and Ruins, and in vicinity*, fol., 1797; *A select collection of Views made* 1791, fol., London, 1799.

Piroli, *Gli Edificj ant. di R.*, 82 pl., *cir.* 1800: Morelli, *Vedute dei mon. ant. più interessanti*, 34 pl., fol., 1800: Valadier, Visconti, e Feoli, *Raccolta delle più insigni fab. di R. ant., etc.*, fol., 1810-26: Seroux D'Agincourt, *History of Art*, fol., Paris, 1811-23; London, 1847: Rossini, *Vedute ant. e mod. di R.*, fol., 1817: Rossini, *Rac. di cinquanta princ. ved. di Ant.*, fol., 1818: Rossini, *I Monumenti dall' xsino al xviii sec.*, 58 pl., fol., (1818): Rossini, *Le Ant. Romane*, 101 pl., fol., 1820; 1823; 1829: Piale, *Vedute di R., e suoi contorni*, 4to., 1820: Dubourg, *Views of the Remains of Ancient Buildings in R. and its Vicinity*, 4to., 26 pl., 1820: Baltard, *Vues et princ. fab. di R.*, 4to., 1822: Rossini, *Le Ant. dei Contorni di R.*, 73 pl., fol., 1826: Amico, *Vedute ant. e mod.*, 40 pl., 1836: Dumont de Flory, *Les Ant. de R.*, 8vo., 1836: Humphreys and Cooke, *Rome and its surrounding Scenery*, 4to., 1838-40: Lear, *Sketches of R. and its environs*, fol., 1841: Gailhabaud, *Monumens Anciens et Modernes*, 4to., Paris, 1842-52: Canina, *Gli Edifizi di R. ant.*, 6 vols., 312 pl., fol., 1848-56: Illustrated London News, 1850, xvi, 315 etc.

List No. 6.—Accounts of Special Buildings.

Walls. Vasi, *Vedute delle porte e mura*, fol., 1739: Nibby, *Le mura di R.*, 8vo., 1820: Rossini, *Le porte ant. e mod., con le mura*, fol., 1829: Azzuri, *Sul. ant. Tabulario Capitolina*, 8vo., 1842: Dennis, *Cities etc., of Etruria*, 8vo., London, 1848; 1879: Taylor, *Stones of Etruria and marbles of ancient Rome*, 4to., London, 1859: Parker, *Archy. of Rome*, 8vo., Oxford, 1874: Freeman, *Historical Sketches*, 8vo., London, 1876.

Arches. [illegible], fol., 1676: Bartoli et Bellori, *Veteres arcus Aug. Triumphis insignes*, fol., 1690: Valadier, *Restauro all' arco di Tito*, 4to., 1822: Rossini, *Gli Archi Trionfali*, fol., 1836.

Forum. Nibby, *Foro Romano, etc.*, 8vo., 1819: Caristie, *Plan, etc., d'une partie du forum R., etc.*, fol., Paris, 1821: Albertolli, *Fregi. etc., forum Trajanum*, fol., 1824: Canina, *Descr. Storica del foro R.*, 8vo., 1834; 1845: Bunsen, *Le forum R. expliqué, etc.*, 8vo., 1835; 1837: Papers by Burgess, 1837 and 1852: Falkener, 1850: Ashpitel, 1857: Taylor, 1859: and l'Anson, 1879: in Roy. Inst. of British Architects, *Sessional Papers*: Parker, *Forum R. and Via Sacra*, 8vo., 1876; 1879: Nichols, *The R. forum, a topog. study*, London, 1877: Dutert, *Le F. Rom. et les forums de Jules César*, etc., fol., Paris, 1876.

Waterworks. Fabbetti, *De Aquis et Aquæductibus*, 4to., 1680; 1686: Falda, Venturini, e Rossi, *Giardini di R., etc.*, fol., (1683 *cir.*); 1693; and *Fontane di R., etc.*, 47 pl., fol., (*cir.* 1685): Rossi, *Nuova raccolta di Fontane*, fol., n.d.: Frontinus, *Comentario degli Acquedotti della città di R.*, by Poleni, 4to., Padua, 1722; 4to., Per., 1805; and by Rondelet, 4to., Paris, 1820: Piranesi, *Le rovine del castello dell' acqua Giulia*, fol., 1761: Canina, *Descr. la speranza vecchia, del acqua Claudia, etc.*, 8vo., 1839: *Detached Essay*, Aqueducts.

Bridges. Martinelli, *Des. di diversi ponte existenti sopra le fiume Nere, e il Tevere*, 4to., 1676: Piranesi, *I ponti antichi, etc.*, 58 pl., *cir.* 1753.

Baths. Arabesques ant. des Bains de Livie, fol., n.d.: *Collection des Peintures ant. qui ornaient les Palais, etc.*, fol., 1781: Cameron, *Baths of the Ancients*, fol., London, 1772; 1785: Carloni, *Vestigia delle Terme di Tito*, fol., (1780) 1786: Scamozzi, *Les*

Thermes des Romains, fol., 1785: Ponce, *Descr. des Thermes de Titus*, fol., Paris, 1786; 1805: Blouet, *Rest. des Thermes de Caracalla*, fol., 1828.

Amphitheatres. Fontana, *L'Anfiteatro Flavio*, fol., 1725: Maffei, *Hist. of Anc. amph.*, 8vo., 1730: Marangoni, *Diss. sopra l'anfit. Flavio, il Colosseo*, 4to., 1746: Vasi, *Teatro delle fab. fatti de Clemente XII*, fol., 1747: Neralco (*i.e.*, Ercolano), *Descr. del Colosseo, etc.*, fol., 1763: Bianchi da Lugano, *Osserv. sull arena, etc., del anfit. Flavio*, fol., 1812: Vaudoyer, *Descr. du théâtre de Marcellus*, 4to., 1812.

Circus. Bianchini, *Desc. dei Circi, etc.*, fol., 1726; Venuti, *La tavola di Circi*, 4to., 1750: Bianconi e Nibby, *Descr. dei Circi, etc.*, fol., 1789: Cancellieri, *Circo Agonale, etc.*, 4to., 1811: Burgess, *Descr. of the Circus on the Via Appia*, 8vo., 1828: Canina, *Sul Circo Adriano*, 4to., 1840.

Columns, etc. Agrippa, *Trattato di trasporta di Obel.*, 4to., 1583: Bartoli e Bellori, *Col. Antonina*, 77 pl., fol., (1672); 1704; 1730: and *Col. Trajana*, 124 pl., fol., 1704-8; 1768: Fontana, *Della trans. dell Obel., etc.*, fol., 1690; and *Contignationes ac pontes N. Zuboglia, etc.*, fol., 1743: Stuart, *De Obel. C. Aug. e campo Martio*, fol., 1750: Piranesi, *Colonna Trajana e Antonine*, fol., 1770: Cipriani, *Sui dodici Obel.*, 4to., 1823: Pollen, *Col. of Trajan*, 8vo., London, 1875. Obelisk.

Churches generally. Panvinus, *De Romæ Basil.*, 1570: Van Aelst, *Sept Eglises privilégiés de R.*, 1589: Severano, *Le sette Chiese di R.*, fol., 1630; 1675: Silvestre, *Les Eglises des Stations de R.*, 41 pl., fol., *cir.* 1660: Rubeis, *Insignium Romæ Templorum*, fol., 1684: Rossi, *Disegni di vari Altari e Capelle*, fol.: Ciampini, *De Sacris Ædificiis, etc.*, fol., 1693; 1747: Gutensohn, *Mon. delle Relig. Christ., etc.*, fol., 1823: Gutensohn und Knapp, *Denkmale, etc., Bas. Roms*, fol., Munich, 1822-27: Valentini, *Le quattro princ. Basil.*, fol., 1832; 1836-46: Fontana, *Raccolta delle migliori Chiese de R. e suburbane*, 102 pl., fol., 1833-5; 1847: Tosi e Becchio, *Altari xiv e xv cent.*, fol., 1834-7; 1842: Bunsen, *Die Basiliken des Christ. Roms*, 50 pl., fol., Munich, 1840-4: Gally Knight, *Ecclesiastical Arch. in Italy*, fol., London, 1842-4: Rossini, *Scenographia degl.' Int. dell' più belle Chiese, etc.*, fol., 1843: Gruner, *Fresco Decorations of Churches and Palaces*, fol., 1844: Zestermann, *Die Antiken und Christ. Basil.*, 4to., Leip., 1847: Hubsch, *Alt Christ. Kirchen*, fol., Carls., 1858-61: Rossi, *Musaici Christ. e saggi dei pavimenta—della Chiesa*, fol., 1872.

Churches. Sta. Maria sopra Minerva, rebuilt 1375, is said to be the only Gothic church in Rome. A Gothic church is being erected 1881 from designs by G. E. Street, R.A.

Neralco *Descr. del Panteon, etc.*, fol., 1763: Fea, *Pantcon di M. Agrippa*, fol., 1806-7: Rupp, *Eglises Principales; Panthéon*, fol., 1824: Suys, *Le Panthéon d'Agrippa*, fol., 1838; Adler, *Das Pantheon*, Berlin, 1872.

S. Peter's and the Vatican. Buonarotti, *Libro d'Arch. di S. Pietro*, fol., (1620 ?): Tarade, *Desseins de toutes les parties de l'Eglise de S. P.*, 31 pl., 1659: Padredio e Falda, *Chiesa di S. Pietro Vat.*, 1673: Severano, *Memorie Sacre* (old S. Peter's), 12mo., *cir.* 1675: Costaguti, *La bas. di S. Pietro*, fol., 1684: Ferrabosco, *Arch. de S. Pietro*, fol., 1684; (1812 ?): Fontana, *Il tempio Vaticano*, fol., 1694: Bonanni, *Templi Vat. historia*, fol., 1696; 1715.

Le Seur, Jacquier et Boscovich, *Riflessioni—della cupola di S. Pietro*, 4to., 1743: Poleni, *Mem. ist. del Tempio Vat.*, fol., 1748; and *Gran cupola di S. P.*, fol., 1748: Chattard, *Nuova des. del Vaticano*, 3 vols., 12mo., 1762-7: Ercolano, *Descr. del Vat., etc.*, fol., 1763: Dumont, *Détail d'Arch. di S. Pierre*, fol., Paris, 1763: Volpato, *Raf. Sanzio, loggie del Vat.*, fol., 1772-77: David, *Recueil d'Arab., loges du Vat.*, fol., 1802; 1808: Lasinio, *Loggie del Vat.*, fol., 1810: Gilius, *Archit. di S. P., con un dichiarazione*, fol., 1812: Nicolai, *Delle bas. di S. P.*, fol., 1815: Rupp, *Chiesa princ. de l'Europe*, fol., Milan, 1824-31: Pistolesi, *Il Vat. descr. ed illust.*, 800 pl., 8 vols., fol., 1825-9; 1838: Valentini, *La Pat. basil. Vat.*, 231 pl., fol., 1845-54: Geymüller, *Les projets princ. pour la bas. di S. P.*, fol., Paris, 1875-80: Letarouilly et Simil, *Le Vat. et la bas. di S. P.*, fol., Paris, 1878, etc.: Durand Claye, *Etude sur la stabilité de la coupole par Bramante*, 4to., Paris, 1879.

Nicolai, *Bas. di S. Paolo fuori* (as before the fire), fol., Rome, 1815.

Rondinini, *De bas. S. Clementis*, 4to., 1706: Mullooly, *S. Clement and his Basilica in Rome*, 8vo., Rome, 1873: Roller, *S. Clemente à Rome, basil. souter.*, 8vo., 1873 ?

Borromino, *La Chiesa della Sapienza*, fol., 1720: Cosimiro, *Mem. istor. della Ch. e conv. di S. Maria in Ara Coeli*, 4to., 1736; and *Mem. di conv. di Fratres Minores della prov. Romana*, 4to., 1745: Uggeri, *Della basil. di S. Paolo sulla Via ostiense*, 4to., 1823: De Angelis, *Descr. et del. bas. S. Mariæ Majoris*, fol., 1621: Valentini, *Basil. Liberiana oggi di S. Maria Maggiore*, 103 pl., 1837: Uggeri, *Della basil. Ulpia nel foro Trajano*, fol., *cir.* 1840: Gruner, *Mosaics of the Chigi Chapel*, 10 pl., fol., 1850.

Rasponus, *De basil. Laterensi*, fol., 1656: Rupp, *S. Jean de Lateran*, fol., Milan, 1824: Valentini e Gerardi, *La Pat. basil. Lat.*, 136 pl., fol., 1832-4.

Cemeteries. Bosio e Severani, *Roma Sott. de Sacri cimeteri*, fol., 1632; 1710: Aringhi, *R. subter. novissima*, fol., 1650; Bartoli, *Gli Antichi Sepolcri*, fol., 1699; 1727; 1768: Rubeis, *Camere Sepol. di Liberti, etc.*, fol.: Bellori et Causseo, *Pict. ant. Crypt. Rom., etc.*, fol., 1706; 1750: Bianchini, *Camera, etc., Sepol.*, fol., 1727: Bellori, *Voyage dans les Cat. de R.*, 1810: Campana, *Due Sepol., Rom., via Latina e l'Appia*, fol., 1840: Raggi, *Mont. Sepol. erette in Rom.*, 8vo., 1841; Perret, *Cat. di R.*, 6 vols., fol., 1851: Macfarlane, *Cat. of R.*, 8vo., 1852: Rossi, *La Roma Sotterranea*, fol., 1865: Roller, *Les Cats. de Rome; Hist. de l'Art, etc.*, 100 pl., fol., Paris, 1881.

Theatre. Dumont, *Salles de Spectacles*, fol., Paris, 1774.

Palaces and Villas. Rubeis, *V. Pamphilia, etc.*, fol., (*cir.* 1630): Manilli, *V. Borghese*, fol., 1650: Rossi, *Pal. diversi*, fol., 1655: Cesio, *Pal. Farnese*, fol., 1657, etc.: Barrière, *V. Aldobrandini Tusc.*, fol., 1647: Ferrerio, *Pal. di R.*, fol., (*cir.* 1680): Falda e Ferrerio, *Nuovi disegni dell' archit. di pal.*, fol., (*cir.* 1680): Falda, *Li Giardini di R.*, fol., 1683; 1693: Rossi, *Nuova raccolta di fontane*, 4to., (*cir.* 1685): Rossi, *Nuovi Splendore*, fol., 1686: Cesio e Rossi, *Galeria depinta nel pal. di Panfilio, da Cortona*, 15 pl., fol., 1690: Fontana, *Sopra il monte Citorio nel campo Marzio*, fol., 1694; 1708.

Albani, *Pict. in æde Verospiæ*, 16 pl., fol., 1704; 1777: Castell, *Villas of the Ancients illust.*, fol., 1728: Bianchini, *Des. del pal. di Cesari*, fol., 1738: Prenner, *Piante delle V. Tiburtina*, 4to., 1751: Piranesi, *Il campio Martio*, fol., 1760: Piranesi, *Peintures de la V. Altoviti*, fol., n.d.: Bottari e Foggini, *Museo Capitolino*, fol., 1782: Stern, *V. di Giulio III, pal. Massimi*, fol., 1784: Marini, *Iscrizioni Antiche delle V. e pal. Albani*, 4to., 1785: Ponce, *Ville Adrienne et Madama*, fol., 1789: Visconti, *Scultura del pal. delle V. Borghese*, fol., 1796-7: Lamberti, *Scultura del Borghese della Pinciana*, 8vo., 1796.

Cancellieri, *Descr. delle campana di Campidoglio*, 4to., 1806: Percier et Fontaine, *Choix des plus célèbres Maisons de plaisances de R.*, fol., Paris, 1809; 1824: Suys et Haudebourt, *Deux pal. Massimi*, fol., 1818: Thon et Ballanti, *Il pal. di Cesari rest.*, fol., 1828: Canina, *V. Borghese*, fol., 1828: Righetti, *Descr. del Campidoglio*, 390 pl., fol., 1833-36: Panini, *Views of Roman Palaces*, fol., 1834: Bouchet et Raoul Rochette, *La V. Pia*, fol., 1837: Sabatelli e Morel, *Rac. di X redute; V. d'Orazio, etc.*, 4to., (1840 ?): Azzuri, *Tabulario Capitolino*, 8vo., 1842: Landesio e Rosa, *Recordi della V. Pinciana*, fol., 1842: Baltard, *V. Médicis*, fol., 1847: Gruner and Platner, *V. Magliana*, fol., 1847: Vivian, *Gardens of Rome and Albano*, fol., 1848: Ruspoli, *Monte Palatino*, fol., 1870 (?): Schreiber, *Die Antiken Bildwerke den V. Ludovisi*, Leip., 1880: Rosa, *Plan des Fouilles du palais des Césars*, 1870.

Ornament. See *S. Peter's, etc.* Rossi, *Raccolta di Vasi diversi*, fol.; and *Ornamenti di Fab. ant. e mod. di R.*, 4to., 1600: Juvarra, *Raccolta di Targhe, etc.*, 4to., 1722: Le Noir, *Nouv. Collect., d'Arabesques à Rome, par L. Poussin*, 4to., n.d.: Tatham, *Etchings*

from Rome, etc., fol., London, 1810: Vulliamy, *Examples of orn. sculpture*, fol., London, 1825.

List No. 7.—Architectural Publications.

Serlio, *Architettura*, fol., Vicenza, 1540; 1584 best edit.: Labacco, *App. all' Arch. nel qual si figurano alcune not. ant.*, fol., 1552; (1568): Palladio, *Le Ant. della città*, fol., 1554; 1622: Scamozzi, *Discorso sopra le Ant. di R.*, fol., 1583: Desgodetz, *Edifices de Rome*, fol., 1682; transl. by Marshall, 1771; *Aggiunta, etc.*, par Valadier and Canina, fol., Rome, 1843: Rossi, *Studio d'Archit. Civile*, 3 vols., fol., 1702-1711-21: Percier, *Palais, Maisons, etc., modernes*, fol., 1798; 1828: Durand, *Parallèle des Edifices*, 92 pl., fol., Paris, 1800; 102 pl., Venice, 1833-4: Taylor and Cresy, *Arch. Antiq.*, fol., London, 1820-2; new edit. 1874: Letarouilly, *Rome Moderne*, 3 vols., fol., Paris, 1828-55: Isabelle, *Les Edifices Circulaires*, fol., Paris, 1843-55: Canina, *Gli Edifizi di R. Ant., etc.*, 6 vols., fol., 1848-56: Turconi, *Fabbriche Ant. di R.*, fol., Milan, 1857; rep. 1874.

A "Table of some of the more remarkable *modern* buildings" from 1375 to 1838 is given in *Penny Cyclopædia*, 1841; also Gwilt, *Notitia Arch. Italiana*, 1818.

List No. 8.—Periodicals.

Notizie degli Scavi di Antichità, 1877, etc.: Instituto di Corrispondenza Archeologica, *Annali, Bullettino e Monumenti*, 52 vols. and plates, fol. and 4to., 1829-80: Daly, *Revue Générale*, 4to., Index: Builder, Building News, and Architect *Journals, passim*. 1. 14. 15. 18. 23. 25. 28. 50. 51. 78. 79. 86. 96. 111.

Amphitheatre. Arch. Æsculapius. Æquimelium. Bath. Bridge. Campanile (*Detached Essay*). Capitolium. Catacomb. Circus. Column. Fountain. Garden. Jupiter. Mausoleum. Memorial column. Mithræum. Monolith. Nymphæum. Obelisk. Orientation. Peace. Peacock. Pyramid. Reservoir. Via.

Detached Illustrations. Arabesque; Arch; Baluster; Basin; Bath and Washhouse; Bell; Ceiling (2); Chapel; Chimney (2); Chimney top; Cinque Cento; Columbarium; Confession; Cornice; Cornice (brick); Door (bronze); Fountain (2); Metal work; Pavement (tesselated); Pedestal; Screen wall; Staircase (3); and Tomb (*cir.* 1500).

ROMÉ (..... de), made the additions and embellishments to the hôtel de Villeroi, rue de Varennes, faubourg S. Germain. 5.

ROME and Augustus, temple to. At Ancyra, Society of Dilettanti, *Ionian Antiquities*, fol., London, 1797, ii, 31. At Pola, Nelson, Paper at Royal Inst. of Brit. Archts., 1852, p. 2: Allason, *Antiquities*, fol., Lond., 1819. Augustus. Temple to Rome and Venus, at Rome.

ROMENGARDI (Lanfranco), also called Facci (L.).

ROMER (Christoph), was employed 1555 at the cathedral at Koenigsberg.

ROMERO (F.), designed 1804 the chapel of S. Miguel in the cathedral at Granada.

ROMERO (Pedro), *maestro mayor* and architect to the duque de Medina Sidonia; see Moreno Melendez (D.). 66.

ROMUALDUS, and Rumalde. A serf of king Louis le débonnaire of France, who *cir.* 827 gave him to Ebon, bishop of Reims, for whom he directed the works of the third cathedral (completed at end of *x* cent. and burnt 6 May 1210); several works of decoration are also recorded as done by him. Flodoard, *Hist. Eccles. de Reims.* Lance, *Dict. Biog.*

ROMULUS, temple to; son of Maxentius, died 309 (formerly called temple to Remus, and also to Vesta), at present the circular vestibule to the church of SS. Cosmas and Damianus, in the Campo Vaccino at Rome. The original bronze door, of the purest age of architecture, is given in Donaldson, *Ancient Doorways*, 4to., London, 1833, p. 43, pl. 20. Braun, *Ruins, etc., of Rome*, 8vo., Brunsw., 1854, p. 55. Penates.

RONCA (Giuseppe), designed 1820 the church and conservatorio delle putte di S. Gioacchino, at Bologna.

RONCALI (el conde), born 22 Nov. 1729 at Cadiz; a military engineer, designed 1792 the *aduana* or custom house at Barcelona; also the chapel in the citadel; and enlarged and modernised the *palacio de la reina (hala del draps)*. He died 26 April 1794, and was buried in the church of S. Josef. 66.

RONCHARD (Alexander); see Rouchard (A.).

RONDE (W. de), with H. van Pé or Pede designed 1525-35 the small hôtel de ville (Flamboyant) at Audenaerden.

RONDEL or bead-moulding in the capitals of the orders. 4.

RONDELET (Jean [Baptiste?]), born 4 June 1743 at Lyon, was a pupil of an architect of that town, and 1763 of J. F. Blondel at Paris. In 1770 he was inspector under Soufflot and then of Brébion, at the church of Ste. Geneviève at Paris, until 1783, when he received a pension from Louis XVI, and made a tour in Italy, studying the antiquities. He again joined Brébion on the continuation of the works, and designed the dome, which has the three casings, and in consequence of the weakness of the pillars he 1806-12 substituted others. He was concerned in all the public works in France 1794-5; the formation of the école publique, etc. Krafft, *L'Art de la Charpente*, fol., Paris, 1805, pt. ii, 25, pl. 72, gives the details of the dome of the church della Salute at Venice, drawn by Rondelet, whose *Architecture of Stone Bridges* was translated by Riou, 8vo., London 1760; 1770. He also published *Mémoire historique sur le Dôme du Panthéon Français*, 4to., Paris, (1797); and 1814: *Traité théorique et pratique de l'Art de Bâtir*, 4to. and fol., 4 vols., 1802-17; 1805-10; 1812-4; 6th edit., 1830-2; 10th 1852, etc.: (Supp. by Blouet, 3 vols., 1847-8; 1852: Italian translation, 6 vols., 4to., Mantua, 1832; largely translated by Gwilt, for the *Encyc. of Architecture*, 8vo., London, 1842; 1867): *Commentaires de Frontin sur les Aqueducs de Rome*, fol., Paris, 1820: and *Mémoire sur la Marine des Anciens*, etc., 4to., 1820; Italian translation, 4to., Milan, 1840. His *Mémoire sur la reconstruction de la Coupole de la Halle aux blés*, 4to., Paris, 1848, was printed after his death 26 Sept. 1829, at Paris, aged 86. *Eloge* by Vaudoyer, and by Baltard 1829. Q. de Quincy, *Notice hist.* Lance, *Dict. Biog.* Breghot du Lut et Pericaud, *Biog. Lyon.*, 1839. 110.

ROND POINT. The French term for the apse of the choir of a large church, The ailes and buildings around it form the chevet. Winkles, *French Cathedrals*, 8vo., London, 1837, p. 18. It is also the Fr. term for a circus at the intersection of crossing streets in a town.

ROOD. A quantity of land equal to the fourth part of an acre, containing 40 square perches. In long measure, the rood or rod of 8 yards is adopted in Cheshire for most purposes, as hedging and ditching, draining, putting up rails, etc. A square rood is $8 \times 8 = 64$ yards, and used always for digging. Cheshire square measure runs thus:

64 yards	=	1 rood
2,560 ,,	=	40 roods = 1 quarter
10,240 ,,	=	4 quarters = 1 acre.

Roughly, 100 yards, or more correctly 102 yards, stepped each way, makes a Cheshire acre: a Cheshire farmer can hardly "take in" a statute acre; R. Holland, in Notes and Queries *Journal*, 1878, 5 Ser., x, 284.

ROOD of brickwork is 7 sup. yards; Builder *Journal*, 1856, xiv, 346. In Scotland, brickwork is usually calculated by the sq. yard, or by the rood of 36 sq. yards. From 4860 to 4320 bricks are required for a Scotch rood, standard thickness, according to the size of the bricks, $9\frac{5}{8}$ by $4\frac{3}{4}$ by $3\frac{3}{8}$ ins., to $9\frac{1}{4}$ by $4\frac{1}{8}$ by $3\frac{1}{16}$ ins.; Peddie, *Practical Measurer*, 12mo., London, 1862, new edit., 7; 255. The old standard measurement for brickwork, viz., the rood containing 63 ft. supr. reduced to one brick thick has almost given place to the sup. yard (9 ft.) also one brick thick, in Nottingham and the Midland Counties generally where the London "rod" is not understood.

ROOD in masonry. In Scotland it measures 36 square yards, 2 ft. thick. The quantity of mortar to be used is specified in 'bolls' (not 'hundred' as in England), which vary in different counties; in Perthshire 6 bolls equal 1 ton; a ton and a half or 9 bolls is the least that should be used. The quantity

by weight should not vary. Rubble work is sometimes estimated by the rood of 63 square *feet*, that is 21 ft. long and 3 ft. high; and sometimes by the rood of 36 square *yards*, that is 36 yards long and 1 yard high. The standard thickness for stone walls is 2 ft., and walls of any other thickness must be reduced to that standard. Hewn work is measured by the square or superficial foot (PEDDIE, *ut supra*).

ROOD or roode. An old term for a cross, or a crucifix or image of Christ on the cross. "The image of our Saviour hangeth on the crosse in the roode." FOXE, *Martyrs*.

ROOD BEAM. The beam across the chancel, or at the junction of the nave and choir, which carried the rood. PEARC, pearch, perch, or PERK.

ROODENBURG (AREND), born 29 Jan. 1804 at the Hague, studied under P. Adams, became supervisor of government works and 1826 professor of architecture at the academy. Among his chief works are 1843 the brass and iron foundry; 1841 the Jewish asylum for aged poor; and 1844 the synagogue; all at the Hague: the protestant church at Kralingen, on piles the greater part driven from 70 to 80 ft.; and several other churches and private dwellings in various parts of the country. 24.

ROOD LOFT (Fr. JUBÉ; Ger. *emporkirche?*; *lettner*). A gallery in a church, whereon a crucifix or rood, and images, as of the Holy Trinity, usually those of the Virgin and of S. John, were placed. In smaller churches this gallery was placed between the nave and chancel; but in cathedrals, sometimes in other situations. It usually had an open screen under it; the ascent to the loft was frequently by a newel staircase. Rood lofts do not appear to have been in use in England before the XIV cent., and not generally until XV cent.; *Glossary of Arch.*, 1838. Many screens are later than the loft. NOTES AND QUERIES *Journal*, 1862, 3 Ser., ii, 126, 177, 233, 309: iii, 293, 359, 452, 498: xi, 235. They were taken down, as related in MACHYN, *Diary*, p. 241, 408, publ. by CAMDEN SOCIETY. A very perfect rood loft, of oak, is at Dartmouth church. A "pleyn rode lofte" is noticed at Stamford church, 1449, NOTES AND QUERIES *Journal*, 3rd Ser., iv, 498. ROOD SCREEN.

Rood loft windows. At S. Mary, Willesborough, and at S. Mary Sevington, both near Ashford, Kent, on the north side of nave the first window which projects externally is of two lights and was clearly intended to afford light to the rood loft; ECCLESIOLOGIST *Journal*, 1849, ix, 337-8.

ROOD SCREEN. An enclosure across the arch separating the chancel from the nave; whether it belongs to the chancel or to the church, is raised in BUILDER *Journal*, 1876, p. 203. The earliest wooden rood screen in England is considered to be the one at Stanton Harcourt, Oxfordshire; PARKER, *Guide to Oxford*, 1846; SKELTON, *Oxfordshire*, 4to., Oxford, 1823; other early ones are at Compton, Surrey; and Northfleet, Kent. An early stone screen, *temp.* Edward III is in the priory church at Christ Church; WALCOTT, *Guide*, 1862. PUGIN, *Chancel Screens and Rood lofts*, 4to., London, 1851. MINNS, *Notes on Rood Screens*, 8vo., 1867. SMITH, *List of Buildings in England having Mural Decorations*, 8vo, London, 1872. *Their decay and demolition*, B. *J.*, 1865, xxiii, 212. "A chancel screen, either of stone or wood, in Ireland is unknown to the writer"; as noticed s. v. IRISH ARCHITECTURE, (p. 43).

Notices and examples will be found in the following publications. ECCLESIOLOGIST *Journal*, ii, 141; iii, 51; rood loft door, 162; iv, 36, 95, 212, 286; of XVII cent., 196, 216; v, 122, 152; 1849, ix, 79, 142, 189-90, 247; *Painted in Monmouthshire*, ii, 106; iii, 91, 140. ASSOCIATED SOCIETIES, *Reports and Papers*, 1873, p. 71, (large; 28, 92); 1874, p. 176; S. Alban's, 1876, p. 233; *Warmington Church*, 1876, lxxxiii: *Stone at Grantham*, 1875, p. 33: Besford church, Worcestershire, almost complete, the only one in the country so perfect, 1876, p. 274. *Of Norfolk*, BUILDER *Journal*, xv, 504. List by Ashworth of those in Devon, 1869, xvi, 58. Llangwm church, near Usk, Monmouth, very rich, 1871, xviii, 158 plate; BUILDING NEWS *Journal*, 1876, xxi, 150; and CHURCH BUILDER *Journal*, 1876, pp. 30-5. COLLING, *Gothic Ornaments*, 4to., London, (1848-50), gives in i, pl., 3, 8, 16, 18, from Ludham, Knapton, Dikleburgh, and pl. 66, 70, 88, from East Harling and Carbrooke; in ii, pl. 98-103, from Ranworth, all in Norfolk and of Perpendicular date; and pl. 65-6-9, from Tilbrooke in Bedfordshire. In *Denbighshire Churches* and at Wrexham, etc., pl. 23, in WILLIAMS AND UNDERWOOD, fol., 1872. NEALE AND LEKEUX, *Churches, etc.*, 8vo., London, 1824-5. *Churches of Northamptonshire*, 8vo., 1849, p. 263, gives Holdenby church (Italian). EXETER ARCHITECTURAL SOCIETY, *Transactions*, 4to., and ii, gives the fine but late example at S. Mary Atherington, Devonshire. GUNN AND WINTER, *R. S. at Randworth, etc.*, 4to, 1867-9.

That at Castle Morton, Worcestershire, is dated 1682; at Chalk S. Mary, Kent, 1660; at Countesbury near Lynton, North Devon, *temp.* Anne.

The rood screen at Wrotham has seven candlesticks, a rare example. At the church of S. Patricio, near Crickhowel, South Wales, the rood loft is very perfect, and beneath it are two ancient stone altars, rare instances of rood loft altars; ASSOC. SOCIETIES, *Reports, etc.*, 1853, p. 359. Others exist at Castle Rising church, and at Glasgow Cathedral.

ALTAR. AMBO. BRIDGE (149). CONTRACTS 1486. ICONOSTASIS. JUBÉ. LOFT. PARCLOSE. PARISH CHURCH. PEARC. PERK. PULPIT. SCREEN. *Illustrations*, pl. 110; 67.

Besides examples abroad mentioned s. v. Jubé, are WEBB, *Continental Ecclesiology*, 8vo., London, 1848; NODIER ET TAYLOR, *Voyages Pittoresques*, Bretagne, at Lambador near S. Pol de Léon with staircase; at Folgoët; at Faouet near Daoulas: Champagne, at church of S. Madeleine at Troyes: Auvergne, La Chaise Dieu, ii, p. 42: Languedoc, at Alby, i, pt. 1; and at Rodez, i, pt. 2, p. 66. A very fine complete example at S. Fiacre near Le Faouët in Brittany, as noticed in MACQUOID, *Through Brittany*, 1877, p. 244-5. 17. 19.

A rare romanesque rood loft in east choir at Naumberg. At Bois-le-duc, BUILDING NEWS *Journal*, 1875, xxviii, 344. WHEWELL, *German churches*, 8vo., London, 1842, 3rd edit., p. 165, notices the rood loft at Oberwesel as the only one known in that country to him as continued to the present time; that "at Sobernheim was pulled down some years ago".

ROOD SOLAR and RODE SOLLER. BRITISH ARCHÆOLOGICAL ASSOCIATION, Worcester meeting, 1851, p. 111.

ROOD SPIRE. The name given to the spire over the crossing in a church, when there were also others in the west front, as at Lichfield cathedral; and Tewkesbury abbey church.

ROOD STAIRS. Perfect with doorways, Croft church, Lincolnshire, *Reports and Papers*, 1865, p. 69. Perfect in chapel, Leigh church, Worcestershire. At Friskey church, Lincolnshire. S. Mary's church, Whittlesey. Ely choir, before restoration (before 1858) "only one", PUGIN. Boston church, at each end. S. Mary at Bury S. Edmunds. Clare church, Suffolk. S. Peter Mancroft, Norwich. Girton church, Cambridge. Bellean church, Lincolnshire. Two doorways, S. Margaret Bilsthorpe, Lincolnshire. S. Peter's Ropsley, and S. John's Corby, Lincolnshire, have bridges spanning the aisle; and S. John the Baptist, Buckminster, a staircase turret; ASSOCIATED SOCIETIES, *Reports and Papers*, 1875, p. 3, 10, and 25. NOTES AND QUERIES *Journal*, List in 2nd Ser., 1857, iv, 409; 481: 3rd Ser., ii, 233.

ROOF. (Anglo-Saxon *hrof;* hence, the carpenter *hrof-wyrhta*, or roof-worker. Ital. *tetto;* Span. *tejado;* Fr. *toit;* Ger. *dach.*) The covering of any building by which its inhabitants and contents are protected from the inclemencies of the weather. Roofs may be considered as to their covering, and the framing which carries such covering. The former is either of metal, of tile, of slate, and sometimes of stone. The Greek temples were covered with long marble slabs, sunk or worked hollow, so that the wet could not run back under the next. Both in ancient and modern times, in all countries, the poorer classes of roofs are thatched with straw, or some similar material. In hot climates, and also in many parts of Italy, the roofs are flat, and covered with

a sort of concrete or cement, which is carried on joists like a floor; the object being to form a terrace to walk on early in the morning or late in the evening, to enjoy the cool air. In other parts, as in Upper Egypt, the roofs are arched with sun dried bricks. In Palestine they are usually of stone, arched or domed.

The principles to be observed in designing a roof are; 1, that it should effectually throw off rain; the elevation of a roof, which governs the angle its rafters make with the horizon, is called its PITCH or slope. 2, that it should be as light as possible, and exercise no effort to overthrow the walls; and 3, that it should not be exposed to what may be called internal changes of form of a character to affect the stability of the framing.

The *forms* of a roof are noticed under: BARREL; BENT TIMBER; COMPASS; CRADLE; CURB; EMY; FALSE; FIREPROOF; FLAT; GROINED; LEAN-TO; MANSARD; M OR VALLEY; PAVILION; PLANK; SHED; TERRACE; TRUSS; TUNNEL; VAULTING; WAGON.

BRYDEN. LAVES'S TRUSS. MATERATIO. PECTINATUM. CHAIN. LIFTING or RAISING. CHARE ROFE.

The *parts* of a roof are called: tie beam, collar beam, hammer beam, principal rafter, purlin, common rafter, brace, strut, king post, queen post, shoulder wedge, hip, valley, ridge, pole plate, dragon tie, eaves, straining piece, lath, boarding.

SERLIO, *Architettura*, 4to., Venice, 1619, vii, 197 to 201: HOPPUS, *Gents. and Builders' Repository*, 4to., 1737; 1748: DUMONT, *Salles de Spectacles, etc.*, fol., Paris, 1763-6; was used by Tredgold: POLEY, *Architectura Civilis*, 4to., Amsterdam, 1770: SMITH, *Ancient Carpentry*, 4to., London, 1787: NICHOLSON, *Carp. new Guide*, 1793; 1808; 1827; new edit. by HAY, 1850: TREDGOLD, *Elem. princ. of Carpentry*, 4to., London, 1820; 1853; by HURST, 1871: LAXTON, *Examples of Building Const.*, fol., London, 1855-58: NEWLANDS, *Carp. and Joiners' Assistant*, 2 vols., 4to., London, 1860: TRENDALL, *Examples for roofs, etc., for theatres, warehouses, churches, etc.*, 30 pl., 4to., 1860: INST. OF CIVIL ENGINEERS, *Proceedings*, Index, 8vo., London, 1881, p. 275: ROMBERG, *Zimmer. baukunst*, 4to., Leip., 1846-50, pl. 32, 52, etc.: SHREVE, *Treatise on the strength of bridges and roofs*, 8vo., New York, 1873: DE VOLSON WOOD, *Treatise on the Theory of the Construction of bridges and roofs*, 8vo., New York, 1873; 1877: HOLLY, *The Carpenters' and Joiners' Handbook; containing a complete treatise on framing hip and valley roofs*, 37 illust., 12mo., 1868: GREENE, *Graphical analysis of roof trusses*, 8vo., Chicago, 1877: *Papers of* CORPS OF ROYAL ENGINEERS, WADDINGTON, *The Doctrines of the Carpentry of a roof examined*, 1849, ser. i, x, 71-152: DENTON, *Comparative cheapness and advantages of iron and wood, etc.*, 8vo., London, 1866: ROBISON, *Mech. Philosophy*, by BREWSTER, 1822; and *Prin. of Construction in Carp., etc.*, 4to., 1859: WEISBACH, *Mechanics of Machinery and Engineering*, 8vo., Lond., 1847-8: EMY, *Traité de la Charpenterie*, fol., Paris. 1837: RONDELET, *L'Art de Bâtir*, fol., Paris, 1812, Supp. by BLOUET, 1847-8: KRAFFT, *Charpenterie*, fol., Paris, 1805; and *L'Art de la Charpente*, fol., Paris, 1819-22; Suppl. by THIOLLET, 1840: RANKINE, *Civil Engineering*, 8vo., London, 1864, p. 469: CRESY, *Encyclopædia, etc.*, 8vo., 1861. 1, 14.

Timber roofs of wide span. ARDANT, *Charpente à grandes portées*, fol., Paris, 1853; and *Etudes, etc.*, 4to., Metz., 1840. Very cheap (150 ft.) at Philadelphia, in NOUV. ANNALES DE CONSTRUCTION, 1856, ii, pl. 7: B. *J.*, xviii, 60 (82 ft.), State Arsenal, New York. ALLGEMEINE BAUZEITUNG, pl. 566, etc. *Illustrations*, s.v., Bent timber, pl. 28, 40; ii, 1854-5.

Great Spans, B. N. *J.*, 1864, xi, 815.

Light roofs, B. N. *J.*, 1864, xi, 779.

Arched roofs; see VAULTING; BRICK ARCH; FIREPROOF; TERRACE; D. A. ALEXANDER. Brick Fireproof roofs, by Grimsley, C. E., *etc.*, *J.*, 1844, vii, 285. Cost of hollow brick-arched roofs in Northumberland, BUILDER, *Journal*, 1854, xii, 158. GAUTHIER, *Genoa*, fol., Paris, 1830, pl. 11 and 51, gives the brick roofs at the ducal palace, and the salle de S. George, both at Genoa.

Glass or Glazed Roof; see CONSERVATORY; GREENHOUSE; SKYLIGHT; PAXTON ROOFING. Rendle (and Burrows) new system of glazing, dispensing with putty or other material, using metal bars and covers; a broken square readily replaced figures in B. N. *J.*, 1872, xxii, 236; also 1876, xxx, 455; xxxi, 6. B. *J.*, xxxv, 990: now called Rendle's "acme" glazing. Helliwell's patent "Perfection system of imperishable glass roofing", BRITISH ARCHITECT *Journal*, 1881, March 25, p. 158. Advertisements in all the journals. Causley's system of glazing without putty is another late invention of like character.

Mediæval or open timber roof. Its varieties may be classed in four main divisions: 1, tiebeam; 2, trussed rafter or single framed; 3, framed with hammer beams and braces; 4, with collars and braces, or with the latter only: SMITH, *Ancient Carpentry*, 4to., London, 1787: BRANDON, *Open Timber Roofs of the Middle Ages*, 4to., London, 1850: B. N. *J.*, v, 991; v, 1061, York Minster and Temple church; xii, 123: C. E., *etc.*, *J.*, vii, 137, by MORRIS; xii, 225: BRITISH CRITIC REVIEW, No. 58, April 1841, xxix, 441-89; No. 62, April 1842, xxxi, 452-77: *Church Roofing*, in ECCLESIOLOGIST *Journal*, 1844, iii, 101, and pl.: B. N. *J.*, 1865, xii, 342: CROWTHER, *Construction of Open Timber Roofs*, in BRITISH ARCHITECT, 1881, xvi, 423: BLOUET, Supp. to RONDELET, *L'Art de Bâtir*, pl. 45, salle des pas perdus at Rouen; and Grange at Meslay: of XV cent., MOLLER, *Denkmaler*, transl. by LEEDS, 8vo., p. 137; 155: 1466, at S. Jean, Dijon, 43 ft. span without tiebeam (A. P. S.); VIOLLET LE DUC, *Dict. Raison.*, s.v. Charpente, describes the trussed roofs of XIII and XIV cents.

Temporary roof; see FELT. Messrs. Rigg in 1863 issued a new material composed of canvas covered with a waterproofing substance with vegetable oil as a basis, and consequently not liable to the desiccating action of the sun. It was called a "patent roofing, waterproof and sunproof" material, 36 and 40 ins. wide in continuous lengths, painted 1½d. per square ft., light and free from smell, and easily fixed.

Roof of Iron. Iron Roofs of Recent Construction, 15 pl., 4to., 1859: PHILLIPS, *Iron Roof in One Span over the Joint Railway Station, New Street, Birmingham*, 1855: TURNER, *Iron Roof over the Railway Station, Lime Street, Liverpool*, 1850: HUMBER, *Record of the Progress of Modern Engineering*, 36 pl., fol., gives Victoria Station and Roof; Roof of Cremorne Music Hall; Roof of Great Northern Railway Station, 1863: ROMBERG, *Zimmer. Baukunst, etc.*, 4to., Leipzig, 1846-50, pl. 68: *Papers* of Corps of Royal Engineers, ser. i, iv, 198; vi, 211; vii, 217; ix, 50-9: RONDELET, *L'Art de Bâtir*, BLOUET, Supp., pl. 69, etc.: BOW, *Iron Roofs of Large Span*, at Royal Scottish Society of Arts, 1853, in C. E., *etc.*, *J.*, xvi, 217; xix, 61: DEMPSEY, *Examples of Iron Roofs of various Spans from 20 to 154 ft.*, 2 vols., 4to., and fol., 1850: CAMPIN, *Treatise on the Construction of Roofs, forming a Suppl. Vol. to the above*, 8 pl.: UNWIN, *Wrought Iron Bridges and Roofs*, Lectures at Chatham, 8vo., 1869: WEALE, *Quarterly Papers on Engineering*, 1844, pt. 5, gives Barry's *Construction of Iron Roof at New Houses of Parliament*, and B. *J.*, ii, 581; and 1857, xv 376: RANKINE, *Civil Engineering*, 8vo., 1864, p. 546: VON WESSELEY, *Arched Iron Roofs*, read at Society of Engineers, 1866, in C. E., *etc.*, *J.*, xxix, 105; 148, with pl. of Crystal palace, Dublin Exhibition; Derby market; Amsterdam Crystal palace; St. Pancras station: and B. N. *J.*: BANCROFT, *Renewal of King's Cross Station and other Roofs*, read at C. and M. Engineers, 1869, B. N. *J.*, xviii, 48; 105; 150: *Stress Diagrams for Straight Rafters Roof*, B. N. *J.*, 1869, xvi, 6: *Wrought Iron dome-shape Roof*, 154 ft. diam. over gas-holder at S. Petersburg, B. N. *J.*, 1864, xi, 254: *Construction of Iron Roofs*, B. *J.*, 1866, xxiv, 110.

WEALE'S *Engineers', etc., Pocket Book*, 1861, p. 344: SPON'S *Architect and Builders' Pocket Book*, 1881.

Examples: Cannon Street railway terminus, 190 ft. 4½ ins.: ENGINEERING *Journal*, March 2, 1866; Birmingham station, C. E. *J.*, xviii, 97; King's Cross station; Derby market hall, 192 by 86 ft. 6 in.; Bradford goods station; and Birmingham New Street station, in B. N. *J.*, 1870, p. 49. Of wrought iron at messrs Cubitt's, INST. OF CIVIL ENGINEERS, *Trans.*, 1841.

At Paris, ALLGEMEINE BAUZEITUNG, 1851, pl., 436; at Wiesbaden, pl. 683. Wrought iron; Théâtre Français at Paris, 1788;

at Rouen, 1794; KRAFFT, *Charpente*, pt. 6, pl. 25-7. Cast iron, pl. 28; used by Brébion, *circ.* 1778; at Halle aux Blés, 1811-2, by Belanger; and Custom house, 36 meters, DALY, *Rev. Gén.*, ix, pl. 14; both at Paris. CINCINNATI. Near MOSCOW, 1746 (p. 132*a*).

ROOF COVERING. (Fr. *couverture; toit*). See ASPHALTE or BITUMEN; BOARDING; BRICK; CONCRETE; COPPER; CORRUGATED IRON; FELT; GALVANISED IRON; GLASS; HOLLOW BRICK; MARBLE; PAN TILE; PAPER; PASTEBOARD; PLAIN TILE; PLATE IRON; PORTLAND CEMENT; POT; REED; SHINGLE; SLATE; STANHOPE'S PATENT; STONE; TESNERA; THATCH; TILE; TIN; TINNED IRON; TUFO; WATERPROOF; WETTERSTEDT'S PATENT METAL; ZINC.

Couverts en argile et autres substances, in DALY, *Revue Gén.*, 1843, iv, 151; 205. "The best covering for roofs is plates of iron tinned"; MILIZIA, *Lives*, edit., 1851, ii, 125, s. v., Ponte.

Weights of materials for roofs, derived from various publications. The weight that a roof has to support is of two kinds: one constant, and the other variable. The first is the weight of the roof itself, and the second consists of the external pressure of wind (AERODYNAMICS; FORCE OF THE WIND) and rain, and the weight of snow when it occurs. The smallest allowance due for wind is taken at about 7 or 8 lbs. per square ft., and for snow at about 5 or 6 lbs. Altogether the weight of the roof, together with the variable pressure of wind, rain, etc., varies from about 23 lbs. as a minimum, to 40 lbs. as a maximum per square ft., the latter is commonly taken as the basis of calculation. The *weight* of a roof depends primarily on the *span*. In *iron*, in a trussed roof the framing for a span of 50 ft. would be from 6 cwt. to 8 cwt. per square; for 70 ft. from 7 to 10 cwt.; and for 100 ft. from 9 to 13 cwt. per square: also INST. OF CIVIL ENGINEERS, *Proceedings*, 1855, xiv, 272.

	Per Square of 100 feet.
Timbering of a slated and tiled roof	550 to 650 lbs.; 4½ to 6 cwt.
¾ inch deal boarding	2½ cwt.; 250 lbs.
1½ do.	4 cwt. 1 qr. 24 lbs.
Slating	8 to 12 cwt.; 10½ cwt.
Do. and timbers	15½ ,,
Westmoreland slates	500 lbs. to 1120 lbs.
Do. Queens	7½ cwt.
Do. Duchesses	3 cwt.
Tavistock slates, Ladies	4 cwt. 2 qrs.
Laths	1 cwt. 2 qrs. 25 lbs.
Tiles	2300 lbs. to 109 sq. ft.
Do.	650 to 1780 lbs.
Do.	10 to 14 cwt; 15½ cwt.
Do. and timbers	21 cwt.
Pantiles, 150 to square; 12 in. gauge	5 cwt. 3 qrs.
Do.	8 cwt.
Plain tiles	15 cwt. 0 qrs. 7 lbs.
Felt	42 lbs.
Thatch	650 lbs.
Tessera (1812)	3 cwt. 3 qrs. 5 lbs.
Lead	6 to 9 cwt.
Milled lead, 4 lbs.	3 cwt. 2 qrs. 8 lbs.
Cast lead	6 cwt. 1 qr.
Copper, sheet, about .022 inch	100 lbs.
Do. 16 oz.	3 qrs. 16 lbs.
Zinc, No. 14 gauge, 22 oz. per foot	147 lbs.

Do. ordinary corrugation, No. 13 gauge, 144 lbs.; No. 14 ditto, 170; No. 16 ditto, 203 lbs.

Do. Italian corrugation, including wood rolls and fastenings, No. 13 ditto, 164 lbs.; No. 14, 180 lbs.; No. 16, 211 lbs.

Plain sheet iron, No. 16 gauge, 2 cwt. 2 qrs. 20 lbs., $\frac{1}{16}$ thick; 300 lbs.

Do. and laths, 1 cwt. 2 qrs. 25 lbs.; No. 20 gauge, 1 cwt. 1 qr. 18 lbs.

Corrugated sheet iron, 3 cwt.; 340 lbs.; and laths, 3 qrs. 12 lbs.

Cast iron plates, say ⅜ thick, 13 cwt. 2 qrs. 3 lbs.; 1500 lbs.

Galvanised corrugated iron, including fastenings, No. 16 B. W. G., 380 lbs.; No. 18, 280 lbs.; No. 20, 224 lbs.

Wetterstedt's patent roofing metal, sheets 9 ft. by 3 ft., 2 lbs. and 3 lbs. per square foot.

ROOM. An enclosed and covered space in a residence; an APARTMENT or chamber. In design, not only its proportion, but its decorative parts, size, and disposition, have to be considered. In hot climates, the capability of rendering and keeping it cool has also to be entertained. REFRIGERATOR. 1. 7. 11. 19.

Resolutions adopted 1859 by the Metropolitan Board of Works relative to underground rooms let or occupied contrary to the Metropolitan Local Management Act; BUILDING NEWS *Journal*, 1859, v, 235.

Proportions; by SMIRKE in BUILDER *Journal*, 1859, xvii, 133.

One of the rules given for calculating the height of a room is to multiply the length by the width and the square root of the area gives the height, which comes somewhat higher than by other methods; CIVIL ENGINEER, etc., *Journal*, 1866, xxix, 280, 311. NOBLE, *Professional Practice*, 8vo., 1836, p. 68: BROWN, *Domestic Architecture*, 4to. (1840), p. 184-5.: CHAMBERS, *Decorative part*, etc., fol. 1759. The difference of light, tone of colour, and other points, may materially alter the effect, even in rooms of the same exact dimensions. HALL. MERCHANTS' HALL.

ROOM GRATE. A term given to a fireplace in which the apparatus is fixed for burning coal; it is a preferable term to that of 'stove', which is more applicable to the iron apparatus standing out on the floor. PYROPNEUMATIC GRATE, of which one of the best is by John Milne of S. Andrews.

ROPE (Fr. *corde; cordage*). Cannabis sativa is the true hemp. The average strength of rope made with the best hemp, was determined, after many experiments made between 1803 and 1808, to be 805 lbs. per square inch of circumference. CHAIN. FALL. WIRE ROPE. DWYER, *Hydraulic Engineering*, 8vo., Dublin, 1847, p. 107: GREGORY, *Mechanicks*, etc., 8vo., edit. 1862, p. 377: BUCHANAN, *Millwork*, 8vo., Edinb., 1814; London, 1841, p. 253: TEMPLETON, *Millwright's Companion*, 10th edit., 8vo., p. 77: AIDE MÉMOIRE, s. v. *Cable; Jurors' Reports*, Exhibition of 1851, p. 101; CIVIL ENGINEER, *etc., Journal*, machinery, x, 77; china grass, 400; strength of wire and hemp, xi, 352: UNIVERSAL MAGAZINE, 1763, xvi, 33: BEARDMORE, *Hydraulic Tables*, 12mo., 1852; and *Manual of Hydrology*, 8vo., 1862, p. xliv: BUILDING NEWS *Journal*, strength, 1868, xv, 661; and 1871, xxi, 464: SPON, *Architect's, etc., Pocket Book* for 1881: HURST, *Arch. Surveyors' Handbook*, 1865, p. 3, 4, 98: WOLSELEY, *Soldier's Pocket Book*, 16mo, London and New York, 1861: ROYLE, *Indian Fibres*, at SOCIETY OF ARTS, April 12, 1854; and LITERARY GAZETTE, 1854, No. 1944, p. 381. 1. 14.

Rigidity of a rope; C. E. *etc., J.*, xix, 75; PENNY CYCLOPÆDIA Suppl.

ROPE BRIDGE. POPE, *On Bridge Architecture*, 8vo., New York, 1811; CIVIL ENGINEER, *etc., Journal*, 1840, iii, 268. At Abergeldie, BUILDER *Journal*, 1863, xxi, 481; GENTLEMAN'S MAGAZINE, 1825, xcv, pt. 1, p. 259; HUMBOLDT, *Atlas Pittoresque*, fol., Paris, 1810-3. At Sirinagur, East Indies, in DANIEL, *Indian Scenery*, 4th series.

ROPE OF WALL. A method of valuing a stone wall by the "lineal rope" in Somersetshire and Devonshire, and perhaps in other south-west counties of England. It is 20 ft. long by 18 ins. thick, and 1 ft. high, = 30 ft. being a little more than the perch of 16½ ft. by 20 ins. by 12 ins. = 27 ft. 6 ins. cube.

ROPER (DAVID RIDDAL), designed about 1805 Albion fire office, New Bridge Street, Blackfriars; 1814 Surrey chapel almshouses; 1822-4 S. Mark's church, Kennington (Greek) for 2,000 persons, cost £15,300; and 1825-6 rebuilt Aske's hospital, Hoxton (R. HOOKE). He was partner with S. Robinson in the valuation of the property for New Regent Street and elsewhere. He died before 1853.

ROPE WALK (Fr. *corderie*), or YARD. There is a very long covered one at Plymouth dockyard. That at Rochefort in France was designed by the great Blondel. CHAPMAN, *Ropemaking as Practised in Private and Public Ropeyards*, 18mo., London, 1858. Rope making; at Boston, U. S., *C. E. etc., J.*, 1841, iv, 248. PONTE.

ROPOGRAPHY; roporography; and rhyparographia; see POMPEII.

ROQUE (EL MAESTRO), 1388 succeeded J. Fabra as master of the works at Barcelona cathedral; he had an assistant Pedro Viader, and is said to have commenced the cloister. He died before 1416, at which time B. Gual was maestro, according to STREET, *Spanish Arch.*, 298. He does not appear in LLAGUNO.

ROQUELIN (JEAN). In 1497-8 he built the two pillars of the *belles clerevoies* at the abbey church of S. Bertin, where he 1499 was working at the chapel of N. D. de Milan, and paved the chapel of S. Blaise; and 1500 advised as to continuing the bell tower of the cathedral at S. Omer. LANCE, *Dict. Biog.*, 1872.

RORICZER, RORISER, RORIZER, and RORITZER (CONRAD), 1430-65 *werkmeister* at the *dom* at Regensberg; designed before 1459 the choir of the Lorenzkirche at Nuernberg (built 1459-77 by H. Bauer and C. Heinzelmann). His mark is found 1445 on the *dom* at Magdebourg. THOMAS, 1482 at the *dom;* directed the construction of the same church at Nuernberg, and was consulted on the works of the cathedral of S. Stephen at Vienna. WOLFGANG, also at the *dom*, was, as ringleader of a sedition, beheaded 1514. 68. 92.

RORICZER (MATHES or MATHIAS), *dombaumeister*, also *thumbmeister* in Regensburg, wrote 1486 *Das Buchlein von der Fialen*, reprinted by REICHENSPERGER, 4to., Treves, 1845. It was noticed in ARCHÆOLOGICAL INSTITUTE, *Journal* for 1847; and nearly reprinted in *Detached Essays*, 1848-49, *On the Ordination of Pinnacles*. POPP ET BULEAU, *Les Trois Ages*, fol., Paris, 1841, p. 15 calls him MARTIN. HOFFSTADT, *Gothischen A. B. C.*, pref., 8. BOISSERÉE, *Hist. etc., de la Cath. de Cologne*, 4to., Munich, 1843, p. 37. HEIDELOFF, *Die Bauhütte*, etc., Nur., 1844, p. 101-16.

ROSA (ANT. FRANÇOIS), 1807 succeeded F. X. Fabri, at the palace of Ajuda at Lisbon. RACZYNSKI, *Les Arts en Portugal*, 8vo., Paris, 1846, p. 332.

ROSACE. A French term given to a round window, or aperture, as used by PARKER, *Abbaye aux Hommes, Caen*, at ROYAL INST. OF BRIT. ARCHTS., Sessional Papers, 1865-66, p. 101, fig. 3, from the spandril under triforium gallery. ROSE.

ROSATI (ROSATO), of Macerata, also a sculptor, 1611-12 designed the church of S. Carlo Borromeo alli Catinari, its cupola is one of the highest in Rome; (the façade by J. B. Soria); LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 715, plan pl. 350; and built at his own cost the church of the Jesuits in his own country. 3. 5. 12. 38. 111.

ROSCHERE, superintendent of the great buildings under Tothmes III. In a tomb bearing his name is found a representation of brick making; the men employed exhibit in complexion and physiognomy a great resemblance to the Hebrews; YORKSHIRE PHIL. SOCIETY, *Guide to the Antiq.*, 1875. p. 62.

ROSE (Fr. *rosace*). A flower used in decoration in all styles of art. According to its size it is called ROSACE, ROSETTE; PATERA. It is often applied in the compartments of a vaulting or of a ceiling, as seen in many places in Rome; the arch of the porte S. Denis at Paris; and elsewhere. *Collection of Capitals, etc., Roses, Mouldings, etc., from the Antique*, fol. (Ackermann), 1824. AGLIO, *Collection of Caps, Roses, etc.*, 4to., London, 1820. L. (R.), *Recueil d'Ornements après l'Antique*, obl. fol., engr. by Chereau, (red ink), *circ.* 1754; ANTONINI, *Manuale*, fol., Rome; and *Antique Roses*, 4to., London, 1832. DESGODETZ; AND TAYLOR AND CRESY, *Antiq. of Rome.* 1. 5. 11. 19.

In late mediæval architecture in England were used, the simple 5-petaled rose, a conventional form of the dog rose (very common in Yorkshire and having the report of being the white rose of the Yorkists); the double 5-petaled rose; the triple 5-petaled rose; 6 petals; and double and triple 6-petaled. The single rose was used *temp.* Henry VI; double rose with rays, *temp.* Henry VI and Edward IV; the triple rose or Tudor rose, on the south porch of King's College chapel, Cambridge, occurs with the portcullis, the badges of Henry VII. BALL FLOWER. CINQUEFOIL. POMEGRANATE.

ROSE (Fr. *crapaudine*). A plate of metal, or of a hemispherical shape, pierced with small holes and placed over the opening of a pipe to prevent dirt passing down or along it with the water, and so stopping it. It is sometimes made of wire.

ROSE (. . . .) the "king's surveyor", in 1634 advised on certain repairs to the church of Allhallows, Barking. MASKELL, *Berkyngechirche*, 8vo., London, 1864.

ROSE (JOSEPH), published "Interior of library at Sledmere, Yorkshire, for sir C. Sykes, bart.", 1794.

ROSE (HENRY and E.), designed 1827 the Licensed Victuallers' asylum, Old Kent road, £8,150; 1835-6 the schools, Kennington lane, for 250 children, £14,000; 1839-40 rebuilt the nave of S. Saviour's church, Southwark, £8,000; 1849 new or ladies' wing to the asylum, £4,000; and 1850 its chapel, board room, court house, and four additional houses, £3,300; 1851 Borough market; and 1853-4 S. Mark's church, Rosherville, £7,000, BUILDER *Journal*, xii, 175. DOLLMAN, *The Priory, etc.*, 4to, London, 1881.

ROSE (WILLEM NICOLAAS), born 8 January 1801 at Cheribon, in the isle of Java, where his father was resident. In 1819 he was instructed by P. Adams at the military school at Delft, and 1827 succeeded his master as professor, and again in 1838. He was 1839 appointed town architect at Rotterdam, where 1844 he designed the new hospital (Byzantine); 1845 the pauper asylum; 1844 the great assembly room and large alterations to the house and gardens of the club Harmony; 1840-46 three new bascule bridges; and several dwelling houses. The date of his death has not been met with. 24.

ROSE BIT. A tool of finer make than a countersink for allowing heads of screws to be driven in flush. The bit is formed like a circular saw diminishing to a point.

ROSELLE. The Etruscan RUSELLÆ, in Southern Italy. DENNIS, *Etruria*, 8vo., London, 1848, ii, 247. SOC. FOR THE DIFF. OF USEFUL KNOWLEDGE, *Pompeii*, 8vo., 1831, i, 60. 23.

ROSELLI (ANTONIO), of Florence, said to be the same as ROSSELLINI (A.)

ROSELLI (. . . .) only son of the painter Cosimo Roselli, a builder and tolerably good architect, died about 1506. VASARI, *Lives*, ii, 178.

ROSELLI (DOMENICO) published *Architettura delle Strade*, 4to., Vicenza, 1769, translated by GAUTIER, *Traité de la Cons. des Chemins*, 8vo., Paris, 1716.

ROSELLINI (ANTONIO); see ROSSELLINO (A.)

ROSELLINI (IPPOLITO), born 13 August 1800 at Pisa, published *I Monumenti dell' Egitto e della Nubia, etc.*, 3 vols., fol. and text, 8vo., i, 1832-41; ii, 1834-36; and iii, 1844 was issued after his death 4 June 1843. BARDELLI, *Biographia*, 1843; reviews in ALLGEMEINE ZEITUNG, and in KUNSTBLATT for 1844. 14.

ROSE NAIL. A nail drawn four-square in the shank and commonly in a round tool, and of various sizes. 4.

A nail with a large flat round head is also so called.

ROSENDALE CEMENT. An hydraulic cement used at the dry dock, Brooklyn, New York; the nine tests of which are detailed in ARCHITECT *Journal*, 1850, ii, 9.

ROSENTHALER (CASPAR), flourished from 1490, was *baumeister* at the klosterkirche at Schwaz and Sterzing in the Tyrol, and died 1514. 26. 92.

ROSE PINK. A coarse kind of lake produced by dyeing chalk or whitening with a decoction of Brazil wood, etc. It is used by paper stainers and in distemper painting, but is very fugitive. 9. 23.

ROSETTE (BIAGIO); see ROSSETTI (B.).

ROSETTI (F.); see ROSSETTI (F.).

ROSEWOOD (Sp. *aspalato;* Fr. *palisandre, palaisandre*, hence PALISANDER or palaxander WOOD). A species of MIMOSA (LINDLEY) or Triptolomea (nat. order, Leguminosæ). DALBERGIA, rosewood of East Indies. ERYTHROXYLON, rosewood of Jamaica. Amyris, rosewood of Honduras, heavy and dull looking. *Bois de rose*, an African wood, is red with yellow streaks. Rosewood has been principally used for rich furniture. Its first introduction is unknown: in 1820 the duty was £20 per ton, but it appears to have been imported earlier for extracting "oil of Rhodium" from it. It is imported from the Brazils (called *Jacaranda Cabuna*), Canary Isles, East Indies, and Africa, in slabs, or the halves of trees, averaging 18 ins. wide,

and 12 ft. long at most. The best is from Rio de Janeiro; the second quality from Bahia; and the commonest from the East Indies, where it is called East India blackwood, though the lightest and most red of the three, and devoid of the powerful smell of the true rosewood, and its pores contain very little of the resinous matter. Violet wood and King wood are probably other much smaller species. The colours vary from light hazel to deep purple and nearly black, sometimes abruptly contrasted; at others striped or nearly uniform. The wood is very strong, hard, and heavy; sometimes very close and fine grained, at others as porous as coarse mahogany, or more abundant in veins; the darkest streaks are very hard. HOLTZAPFFEL, *Woods, etc.*, 1843. CIVIL ENGINEER, *etc., Journal*, 1854, xvii, 147, from *The Cabinet Maker's Assistant*, 4to., Glasgow, 1853. BUILDING NEWS *Journal*, 1856, ii, 730; which, 1874, xxvi, 8, describes the process of rosewood graining.

ROSHAN. The Persian term for the MESHREBEEYEH of EGYPT.

ROSILINI (BERNARDO); see ROSSELLINI (A.)

ROSIN. The residue after distilling the light essential oil generally called spirit, from turpentine. When the distillation is stopped at the proper point, the product is yellow rosin, containing a little water, which being expelled, gives the transparent rosin. By continuing the heat, the residue is made brown or black. It melts at 276° Fahr., liquid at 306°, and is decomposed at red heat. Rosin is an ingredient in varnishes, in perfumery, etc.; when melted it is used in caulking the seams of ships; as a reducing agent in soldering; and for covering the bows of violins to prevent them from slipping over the strings without producing vibration. Nearly all the rosin of commerce is furnished by North America.

ROSS or ROSSCARBERY. A small town near Cork in Ireland, having a small parish church (Gothic), formerly cathedral. The see was united to that of Cork in 1586, and 1835 with Cloyne. 50.

ROSSELLI (MATTEO), is mentioned 8 March 1635 with many other architects as making a design for the façade of Florence cathedral; *La Metrop. Fiorentina*, 4to., Flor., 1820, p. 67.

ROSSELLINO, ROSELLINI, and ROSELLI (ANTONIO), born 1427, brother of Bernardo, also a clever sculptor, designed 1459 the noble tomb to Jacopo the cardinal of Portugal (died 1466) in the church of S. Miniato al Monte near Florence (GONNELLI, *Mon. Sepol. della Toscana*, fol., Flor., 1819); and 1466 designed the admired chapel of S. Giacomo in the same edifice. He executed a copy of the above tomb to the wife of the duke of Malfi, nephew of pope Pius II, in the church of Monte Oliveto at Naples. Probably the circular cinquecento pulpit in the cathedral at Prato was executed by him with Mino da Fiesole. He died "aged 46" at Florence, and "about 1490" according to VASARI, who must be wrong in one of the two dates 1427 and 1490. SELVATICO, *Venezia*, 8vo., 1847, p. 235. His son BERNARDO succeeded him in his works. 5. 25. 28. 73.

ROSSELLINI (IL), or ROSILINI, also BERNARDO di Firenze, properly BERNARDO GAMBARELLI or Gamberelli, of Florence, born 1409, was highly esteemed by pope Nicholas V (1447-55), for whom he designed at Fabriano the market or piazza, and restored the church of S. Francesco (MURATORI, *Rer. Ital.*, 1723-38, iii, 2, according to RUMOHR, *It. Forsch.*, ii, 193, p. 929); at Gualdo, made additions to the church of S. Benedetto; repaired and strengthened the church of S. Francesco at Assisi, adding a new low-pitched roof; designed many edifices at Civita Vecchia; rebuilt more than one third of the walls of Civita Castellana; rebuilt and enlarged the fortress at Narni with additional walls; designed the large fortress at Orvieto, including the palace (but DELLA VALLE says the fortress is some ages older, and all the palaces are by I. Scalza); at Spoleto enlarged and strengthened the fortress, adding dwellings on it; at Viterbo restored the baths, adding handsome dwellings, which, according to BOTTARI, were 1739 in decay. At Rome, he restored and renovated the city walls, adding towers; formed additional fortifications to the castle of S. Angelo, with new rooms, etc., inside the castle; the restoration of the forty churches called *stationes*, instituted by pope Gregory I (590-604), thus, 1450, reducing to its present form the church of Sta. Maria in Trastevere (portico by C. Fontana, LETAROUILLY, p. 671); the churches of Sta. Prassidia, S. Teodoro, S. Pietro in Vincolo, with other minor ones; and the basilicas of S. Giovanni Laterano, including decorations (Borromini and A. Galilei); of Sta. Maria Maggiore (including restoration of the papal palace and other works, VASARI); of S. Stefano in Monte Celo; S. Apostolo; S. Paolo fuori le murà, its roof and decorations (the portico by A. Specchio, and portions by O. Lunghi); and of S. Lorenzo fuori le murà (LETAROUILLY, *Rome Moderne*, 4to., Paris, 1840, p. 555, pl. 268). He also designed for the pope a magnificent church, palace, streets, villas, theatre, etc., to be erected in the suburbs of Rome, a scheme which died with the pope; designed certain decorations to S. Peter's, of which the model is lost; designed the round tower of the Vatican; and with L. B. Alberti began 1450 a new S. Peter's with a tribune, demolished by Bramante (LET., p. 131; BONANNI, 229). Bernardo was also in the service of the succeeding popes Calixtus III (1455-58), and Pius II (1458-64), for whom it is thought he carried out the works at Pienza (RUMOHR, ii, 180-94; LÜBKE, *Gesch. der Architekten*, 1865, p. 657; CAMPANI, *Vita Pii II.*; MURATORI, iii). He executed the fine tomb of Villana 1451 in Sta. Maria Novella at Florence (CICOGNARA, *Storia*), and of L. Bruni of Arezzo in the church of Sta. Croce. GAYE, *Carteggio*, 8vo., Flor., 1839, i, 188, which, 243, states that the palazzo Spannochi at Siena begun 1471 shows the modifications of the Corinthian capital which form a mark of this architect's work, who died about 1470. VASARI, *Vite*, Bohn's edit., ii, 130-4. NAGLER, s. v. Bernardo and Rossellino.
3. 5. 25. 30. 112.

ROSSETTI (BIAGIO), 1495-1515 restored the church of S. Francesco at Ferrara (not by P. Benvenuti); BARUFFALDI, *Vite*, 8vo., Fer., 844, i, 384; 1498-9 renewed the choir, with an apse, of the cathedral; and after 1473 built the nave and ailes of Sta. Maria in Guado, begun by B. Tristano. He died 1516. WOODS, *Letters*, 4to., London, 1828, ii, 119.

ROSSETTI (CESARE), also a painter, sculptor, and engineer, born about 1490, died about 1550. PASCOLI, *Vite de' Pittori, etc. Perugini*, 4to., Rome, 1732, p. 69; 71-3.

ROSSETTI (F.), about 1770 added the cupola to the cathedral at Ripatransone, begun by G. Guerra.

ROSSI (CARLO), of Naples, pupil of V. Brenna (died at Dresda about 1819) at S. Petersburg where he designed 1819-27 the military gallery in the Winter palace, 180 ft. long, lighted by a skylight (i, 515-7); the new Michaelov palace, 364 ft. long; its riding house and grounds (i, 543-54); the building containing the chancelleries of the general staff (*état major*), with Brullov, and its hall of cast-iron containing the archives of the army, 250 ft. by 100 ft., vaulted 70 to 80 ft. high, having slightly ascending galleries with two rows of five ranges of shelving (ii, 75-7); he also made a design for the enlargement of the public library (ii, 238); Augt. 1832 designed the Alexandrinsky theatre; and the hall of Archives (Gothic) of iron 142 ft. by 57 ft. (Clarke, engineer). GRANVILLE, *S. Petersburg*, 8vo., London, 1835.

ROSSI (DOMENICO DE), born 1678 at Morco; designed 1714 the church of the Virgin belonging to the Teutonic order at Laybach; 1715-28 the interior of the church (by Pozzo) of Sta. Maria de' Gesuiti at Venice; the façade to that of S. Eustachio; 1721 the palazzo Sandi in corte dell' Albero, and 1724 the palazzo Corner della Regina on the grand canal, all at Venice, where he died 1742. SELVATICO, *Venezia*, 8vo., 1847, p. 443-4. MOSCHINI, *Guida di Venezia*, i, 661. MANIAGO, *Guida*, 1839, p. 27, notices his employment at the duomo at Udine. 14. 26.

ROSSI (FILIPPO), designed in XVIII cent. the church of S. Biagio ora chiesa dell' I. R. Marina; and the scuola del Rosario, near S. Giovanni e Paolo, both at Venice. SELVATICO, *Venezia*, 8vo., Ven., 1847, p. 472.

ROSSI (Francesco), designed 1766 the church to the Madonna dell' Ispirazione, at Bologna.

ROSSI (Giovanni Antonio de'), born 1616 in the territory of Brembato near Bergamo (not at Rome as Vasari), son of Lazzaro de' Rossi, became a pupil of V. or M. Peparelli; he was assistant at the building of the palazzo Celsi near the church del Gesù, and did there the *portone* and *scala;* modernised the palazzo Nari in the campo marzo, changing the *portone*, the *scala*, and the *cortile;* designed 1660 the palazzo Aste, afterwards Rinucci, later Buonaparte, piazza di S. Marco, on the Corso, at the corner of piazza di Venezia (Ferrerio and Falda, *Palazzi, etc.*, fol., Rome, 1655, pl. 70-1; Blondel, *Cours*, 8vo., Paris, 1773, iii, 426, viii, pl. 63; Letarouilly, *Rome Moderne*, 4to., Paris, 1825-60, p. 254, pl. 111): 1670 pal. Altieri, piazza del Gesù (Ferrerio and Falda, pl. 80; Percier et Fontaine, *Maisons de Plaisance*, fol., Paris, 1824, pl. 44-5; Let., 208, pl. 67): pal. Astaldi or Astalli, via d'Araceli (Let., 177, pl. 40): pal. Muti Bussi in the same locality (Let., 701, pl. 342): Baccelli a' Cesarini; Baldinotti near the church della Sapienza: Colonna di Sonnino, via di Torre Argentina (Let., 651): Nunez in the strada de' Condotti; and Gomez in the strada della Croce. He was appointed architect to the church of S. Jacopo degli Spagnuoli, where he erected the two organ galleries, and most of the neighbouring houses; the spedale delle donne at S. Giovanno Laterano; and renewed the chapel for the family Lancellotti in that church (Let., p. 485; Rossi, *Altari*, fol., Rome, n.d., pl. 45); the small chapel and altar della Santissima Pietà, nel sacro monte della Pietà (Rossi, pl. 46); Sta. Maria in publicolis; S. Pantaleo alle Scuole Pie; Sta. Maria in Campo marzo (Rossi, *Il Nuovo Splendore*, fol., Rome, 1686, iii, pl. 6); the church della Maddalena (completed by another architect); the church della Concezione of the nunnery in the Campo marzo; the church of S. Rocco in the Ripetta; and restored with marbles, etc., the church of S. Silvestro in Capite, adding the portico (Let., 570). He also restored numerous churches, erected many altars, enlarged and built many new houses, especially one "nella contea di Carpegna". Amongst his pupils were F. Pozzoni, and C. A. Tirzaghi. He died 9 Oct. 1695, leaving the large (for the time) fortune of 80,000 scudi (400,000 Fr. livres). His epitaph in the church del Gesù is given by Pascoli, *Vite Moderni*, 8vo., Rome, 1730, i, 320. Quatremere de Quincy, *Vies*, 8vo., 1830, ii, 363. 3. 12. 25. 42.

ROSSI (Giovanni Mattia de'); error for Rossi (G. A. de').

ROSSI (Mattia or Mattei dei), born 14 January 1637 at Rome, son and pupil of the architect Marc Antonio de' Rossi (of no esteem); became established in the office of L. Bernini, whom he accompanied 1665 to Paris, and whose subsequent works for twenty-five years he appears to have superintended, and to have defended; and on his death 1680 succeeded to most of the offices held by Bernini, including that of architect at S. Peter's. He superintended the palace for pope Clement IX (1667-70) at Lamporechio; and the church of the Scolopi at Monterano.

At Rome he designed the collegio di S. Andrea del Noviziato, and the altars in its church; the tomb to pope Clement X (d. 1676) in S. Peter's; and to monsignore Liberati in Sta. Maria Maggiore; the churches to Sta. Francesca Romana; and of Sta. Maria in Portico or Sta. Galla (or façade only); (Rossi, *Il Nuovo Splendore*, fol., 1686, iii, 29); the chapels in the church of S. Silvestro in Capito; the tribune and high altar in the church degli Orfanelli; the capella Torre in the church della Maddalena; 1685 restored the capella Capizucchi in that of Sta. Maria di Campitelli (Rossi, *Altari*, fol., Rome, n.d., pl. 10); and the organ gallery over the great door of the Madonna della Vittoria. He modernised (or rebuilt) the church and convent of S. Francesco à Ripagrande, adding the vaulting and the façade (Rossi, *Il Nuovo Splendore*, 1686, iii, pl. 28); enlarged the church and nunnery of Sta. Maria delle Vergine at the foot of Monte Cavallo; completed the church di Monte Santo in the piazza del Popolo, adding the cupola and tribune (Rossi, *Altari*, pl. 30-1); the façade to the church (by F. of V. della Greca) dell' Angelo custode (Rossi, *Il Nuovo Splendore*, fol., Rome, 1686, iii, pl. 14); the high altar (since replaced) in Sta. Agnese in the piazza Navona; the *portone* on the right hand side of the palazzo Altieri, with the stables; the palazzo Muti Papazzuri, piazza della Pilotta (Letarouilly, *Rome Moderne*, 4to., Rome, 1840, p. 153, pl. 8); the *dogana* on the Ripagrande; 1686 the ospizio di S. Michele, as well as the harbour there, both in conjunction with C. Fontana; and many works for pope Innocent XII (1691-1700), especially the scala, portico, and general completion after Bernini (also ascribed to C. Fontana after the death of Mattei) of the camera Apostolica or Curia Romana, on Monte Citorio; besides executing the cupola of the church (by G. Guerra) of S. Andrea a Monte Cavallo for the PP. Gesuiti on the designs of Bernini (Rossi, *Il Nuovo Splendore*, pl. 17). He wrote an account of the dome of S. Peter's, combatting the idea of its falling, and that the one niche in each pier was the design of the original architect.

Out of Rome, he erected for the prince Panfili the elliptic duomo and the campanile at Valmontone; and also the palazzo at Nettuno. He held the cross of the ordine di Cristo, and was president of the accademia di S. Luca. Domenico, a brother and assistant, born 10 January 1659, died 28 August 1703; Filippo Barigione was another pupil or assistant. Mattia died 2 August 1695; the epitaph in the church of S. Andrea delle fratte is given in Pascoli, *Vite Moderni*, 8vo., Rome, 1730, i, 322-8. 3. 12. 25. 42.

ROSSI (Rosso de'); see Rosso (G. B. di J. del).

ROSSI (Vincenzio de), of Fiesole, also a sculptor, was a pupil of B. Bandinelli, went with him to Rome and worked at the tombs of popes Leo X (died 1522) and Clement VII (died 1534). 5. 73.

ROSSI (.....), of Rome. A drawing by him 1754, being a longitudinal section of the Raphael loggia of the Vatican, was presented 1836 by F. Catherwood, to the Royal Institute of British Architects. One of this name submitted a design with twenty-one other architects for the façade of S. Giovanni Laterano at Rome; that by A. Galileo was ultimately selected by pope Clement XII (1730-40): and a "Rossi of Rome" designed the façade of the cathedral at Vilna, assisted by the Polish architect Skuczewicz. Ciampi, *Notizie di medici, etc.*, 8vo., Lucca, 1830, p. 93.

ROSSI (Ignazio del), designed the cortile and entry of the palazzo Orlandini del Beccuto at Florence, which had been formed before 1689 by C. Ferri out of two houses. Fantozzi, *Nuova Guida*, 12mo., Fir., 1842. 68.

ROSSO (Giovanni Battista di Jacopo del), called del Rosso, and in France, maître Roux and Rosso de' Rossi, of Florence, born 1496; also a painter and stuccoist, designed many buildings in and near Arezzo, among others a chapel for the rectors of the fraternità at the lower end of the piazza, since destroyed. He was invited about 1530 to France by François I. Appointed superintendent of the works at Fontainebleau, he designed and decorated the grand gallery, completed by F. Primaticcio (destroyed 1738), and the pavilion now a staircase. He was also appointed a canon of the Sainte chapelle. He poisoned himself 1541. Vasari, *Lives*, 8vo., edit., 1851; Pattinson, *Renaissance of Art in France*, 8vo., 1879, p. 65-8. 5. 14. 68.

ROSSO (Giuseppe del), of Florence, wrote in Magazzino di Letteratura, etc., 1805, i, the *Aneddoto Istorico relativo alla facciata, sec. xvii al duomo di Firenze, etc.;* also given in La Metropolitana Fiorentina Illustrata, 4to., Flor., 1820, p. 63, which work is attributed to him by Vasari, *Vite*, 8vo., edit., 1848, iii, 224 note: some other works 1787-1820 are named in the catalogue of the British Museum. He restored the torre della Vacca, or di S. Zenobio, or de' Torregiani, or de' Girolami (xi cent.), in the palazzo Lamberteschi now Bartolommei; 1790 designed the scala del cavaliere in the Boboli gardens; repaired 1809 the palazzo de' Signoria (M. Michelozzi's work was in 1434), and published a collection of remarks 1815 at Siena explaining the methods pursued by him (not in B. M.

Library); 1814-8 restored and enlarged the church of S. Alessandro at Fiesole; 1817 designed the Goldoni theatre for 1600 persons; and with N. M. G. Paoletti altered the ospedale di S. Matteo (designed 1384 by L. Baldoni) for the accademia de' belle arti, all at Florence. The date of his death is not given. FANTOZZI, *Guida de Fir.*, 8vo., Flor., 1842. 68.

ROSSO (ZANOBI DEL), of Florence, son of a Guiseppe Ignazio Rossi, about 1750 completed, with the vestibules to the hall of Niobe, the palazzo Uffizi at Florence; restored the lantern, etc., of the cathedral of the same city, where 1769 he modernised the church of Madonna de' Risci; 1772 designed the oratory and façade of the convent of S. Firenze; 1776 the *caffeos* and the *tepidario* in the Boboli gardens; completed 1778 the palazzo Ferroni now Magnani; and the palazzo Martini. The date of his death has not been ascertained. FANTOZZI, *Guida*, 8vo., Flor., 1842. 68.

ROSSO of Florence, about 1400; see BARTOLO (N. DI.)

A "maestro Rosso" 1277 did the third or bronze basin of the fountain in the piazza at Perugia.

ROSSO ANTICO MARBLE. A BRECCIA; the finest is of a uniform deep blood-red or liver colour. The grain is very fine and close, and takes a fine polish. It is sometimes sprinkled with minute black crooked lines like network; also livid white blotches appear occasionally, and sometimes livid white veins; these injure the red colour and render it difficult to be worked; this is probably the ROSSO ANNULATO. The rosso antico is not very hard, but treats the tools like a whetstone, and is rarely found in large pieces. Antique examples occur in the tribune in the church of S. Prassede, at Rome, which is ascended by a double flight of steps of rosso antico, said to be the largest blocks known: a small spiral column in the palazzo Colonna, called (in error) columna Bellica; and the celebrated antique Fauns in the Vatican, in the museum of the Capitol, and in the palazzo Doria. The columns in the salle d'Apollon in the Louvre, at Paris, are of red oriental granite, and not of rosso antico as usually stated (BUILDER *Journal*, 1870, xxviii, 33).

The quarries were formerly supposed to be in Egypt, but they are stated to have been rediscovered 1846 by prof. Siegel on the southern slope of the island of Tinos, and in the Maina, near the village of Damaristika, in the peninsula of Laconia. He furnished a number of columns for the court of the basilica of S. Paolo at Rome. A slab from Greece was exhibited at the Paris Exhibition of 1867. BUILDING NEWS *Journal*, 1857, iii, 143; 1872, xxiii, 200. CIVIL ENGINEER, *etc., Journal*, 1854, xvii, 102. CLARAC, *Musée du Louvre*, 8vo., Paris, 1841. HARTWIG, *Subterranean World*, 1872.

ROSS OF MULL GRANITE; see GRANITE (p. 75).

ROSTRAL COLUMN (*Columna rostrata*). A column so called by the Romans from having three ships' beaks proceeding from each side of it, and designed to record successful engagements at sea. The one erected in honour of the consul C. Duillius, B.C. 261, was originally erected in the forum and is now preserved in the museum of the capitol. An imitation of this column, from a medal of Augustus, A.D. 14, was made by M. A. Buonarroti, and is now in the palazzo dei conservatori, at Rome (DONALDSON, *Arch. Numis.*, 8vo., p. 53). Modern examples were erected 1829 at Bordeaux by P. A. Poitevin; and at Château de Mereville, LA BORDE, *Jardins de France*, fol., Paris, 1808-15, pl. 54. 78.

ROSTRUM. The beak of a ship of war, made of bronze or of iron, and intended to act against the timbers of an enemy's vessel, like the battering-ram against a wall. At first a single beam, it became formed by several beams cased with sharp metal points. The tribune, or rostrum in the Roman forum (in which there were three or more) from which the people were addressed. Perhaps the earliest were the prows of the ships of Antium which were placed in the forum. It is supposed to have resembled the *ambo* of the early Christian churches at Rome, the speaker being enabled to walk to and fro while addressing his audience. Statues were placed on the rostrum. PARKER, *Forum Romanum*, 8vo., Oxford, 1879, p. 19-20. 14. 78.

The term "rostrum" is often used for the platform in Congregational churches.

ROT; see DRY ROT; WET ROT. CHEMISTRY OF BUILDING MATERIALS. KAMPTULICON. ATMOSPHERIC INFLUENCE. 1. 14.

ROTHELEY (RICHARD DE), not ROCHELLE, as in BRITTON, *Windsor*, in *Arch. Antiq.*, 4to., 1812, iii, 30; POYNTER, *Essay* prefixed to *Illustrations, etc.*, fol., 1841; and CIVIL ENGINEER, *etc., Journal*, iv, 280. He was appointed 23 Edw. III (1349) with R. de Bernham and J. Peyntour to press workmen to be employed at Windsor castle: and 1350 was appointed supervisor of the works, until perhaps 1356 when William of Wykeham succeeded. TIGHE AND DAVIS, *Windsor*, 8vo., 1858, i, 165; 168.

ROTHENSTEIN (ARNOLD VON), about 1331-93 was at work on the *dom* at Wuerzburg. 92.

ROTHERHAM (THOMAS), 1660-61 clerk of the works at Whitehall under sir J. Denham at 3s. per day, and under sir C. Wren at 4s. 8d. per day.

ROTHER NAIL. This nail is used principally to fasten "rother irons" to ships, and requires a full head, and to be made so as to hold fast in the wood to the greatest degree without clenching. 4.

ROTTERDAM (Lat. Roterodamum). The second city in Holland, situated on the rivers Maas (Fr. Meuse), and Rotte or Roter. Over the Maas is the stone Willemsbrug crossing by the Noorder eiland, erected after 1825 by P. Adams, and again 1874-79? (BUILDER *Journal*, xxxv, 529): and near to it the high railway bridge, about 1,600 ft. long, 1869-77 April 29 (B. *J.*, 528). The city is moated, and has six land gates; outside the Delft gate a new quarter has been formed nearly half as large as the old city. The old dwellings, exhibiting the peculiar style of Dutch architecture, are chiefly of brick, of small size; where freestone is used it must have been obtained at great expense. Canals intersect the old town, the three principal ones forming *havens* or harbours, the tide rising 10 to 12 ft. A bronze statue of Erasmus 1622, 10 ft. high, by Henry de Reiser, on a marble pedestal; a bronze monument 1762-1834 to Gysbert Karel van Hogendorf, by Jos. Geefs; and a white marble statue of poet Tollens have been raised. Laurentius grootekerk dates 1414-72; the tower which 1651 inclined 3½ ft. was restored to the upright by K. J. Persoons and the foundations renewed; the organ, by C. J. F. Giudici, completed 1840, is considered superior to that at Haarlem; the pipes are left of the natural colour of the metals. Prinsenkerk was enlarged 1639 by H. van den Heuvel. A Roman catholic church in the Leeuwenstraat is by C. J. F. Giudici (died 1819); another after 1825 is by P. Adams. Reformaterkerk before 1857 (German Gothic) is very large. For the *stadthuis* (Italian), a new design was made 1781 by C. Giudici, and one for partially renewing the old edifice; it was rebuilt after 1825 by P. Adams; the exchange, larger than that at Amsterdam, was finished 1736; the former house of the East India company is now warehouses; and the former West India house 1695 was by W. A. Egmont; the vast *gemeene-lands-huis* for the province of Zeeland, planned 1662-4 by J. Lois, is one of the finest in the city: the arsenal now barracks; the concert room; and several of the best houses are all by C. J. F. Giudici; the museum was founded about 1847; fish market by P. Adams after 1825; the hospital (Byzantine) 1844 by W. N. Rose, given in HUSSON, *Etudes sur les hôpitaux*, 4to., Paris, 1862, pl. 13; and by MARJOLIN, *Notice*, Paris, 1862: the hôtel Schieland; the theatre outside the Delft gate; all deserve attention, with the pauper asylum 1845 by W. N. Rose, who also designed 1844 the great assembly room, and made large alterations to the club Harmony, 1840-46 three bascule bridges, and several dwelling houses. BATTY, *Select Views*, 4to., 1832. PENNY MAGAZINE, 1834, iii, 332-5. 14. 28. 50.

ROTUNDA. A building circular in plan both internally and externally; a hall or apartment of that shape included within and forming only a portion of the edifice containing it. DOME; CIRCULAR BUILDINGS; PANORAMA; ROUND CHURCH. 1. 14.

List of rotunda edifices:—

	Diam.	High.
Athens; Choragium of Lysicrates.		
Olympia; the Philopeian.		
Rome; Museum of the Vatican. Simonetti	50	
Padua; adjoining the palazzo Giustiani, for music, by Falconetto.		
Vienna; Exhibition of 1873; iron; clear span of 360 ft., 107·83 ext. BUILDER *Journal*, xxxi, 290. J. S. Russell	84·1	
Berlin; Museum, central hall. Schinkel	67	70
Kehlheim; Hall of Liberation of Bavaria	96	
S. Petersburg; Taurida palace. GRANVILLE, S. Peters., 8vo., i, 541.		
——— Cirque Ciniselli, B. Quesnel, *Zodtschy*, viii	163	
Paris; 1844, Douane. R. Groterin	120	
Epernay; Paris and Strasburg railway, Engine shed. ANNALES DE LA CONSTRUCTION, 1857, iii, pl. 47-8	68	
London Coliseum, Regent's Park, by D. Burton. BRITTON AND PUGIN, *Public Edifices of London.*		
Chalk Farm, Camden Town; Engine House	160	
Woolwich Museum; 24 sides, by J. W. Hiort, for John Nash	120	
Ranelagh, 1742, by Wm. Jones, 2 pl.	150	
Croydon Waterworks; Reservoir	75	
Cheltenham; Montpellier Spa, 1826, by J. B. Papworth	52	54
Stourhead, copy of Pantheon; STORER AND GREIG, *Antiq. Cabinet*, vii	36	
Liverpool; the Rotunda hall of the Free library, having a floor 100 ft. diam. over it without any pillars; by C. Sherlock, 1880.		
Oxford; Radcliffe library, J. Gibbs	52	90
Kedlestone; Lord Scarsdale	42	54
Edinburgh, 1774; Register office, R. Adam	50	80
Dublin; the Rotunda, 1757, by G. Ensor	80	40
New York; Rotunda, 1818, by Vanderlyn, for a panorama, now used by Croton waterworks	53	40
Custom house, 1835	80	
United States treasury, etc.	60	

ROUEN (anc. Rotomagus). The former capital of Normandy, and now the capital of the department of Seine Inférieure, in France, and situated on the river Seine, which is lined with broad quays having handsome houses (DE CESSART, *Description de travaux hydrauliques*, 4to., Paris, 1806-8). A stone bridge 1829-32, by C. F. Maillet du Boullay, crosses at the end of the île Lacroix, having in the middle of it a statue to Corneille 1606 by David d'Angers; (*Pont en pierre à construire sur la Seine à Rouen*, 4to., Paris, 1815). The suspension bridge 1834-6 is 650 ft. long. A bronze statue to Boieldieu is by Dantan. A proposed monument by le Carpentier, to Louis XV, is given in PATTE, *Monumens*, fol., Paris, 1767, p. 178. The equestrian statue of Napoleon I, 1865 by Vital Dubray, pedestal by Desmarets. The chief fountains are La croix de Pierre, 1500-15 (NODIER, ii, pl. 168; BRITTON), rebuilt by Barthélemy 1872; de la Crosse, XV cent. (NODIER; BRITTON) restored *cir.* 1861; de Lisieux, 1518; and Joanne d'Arc. The old *bureau des finances* (NODIER) is now a club and has been restored; the tour de beffroi 1389 has a staircase; the tour de la grosse horloge 1511-17 across the old street; the hôtel du Bourgthéroude 1506-37 round a courtyard; restored *cir.* 1865 (NODIER, etc.; BRITTON AND PUGIN; a view in the courtyard, MONITEUR DES ARCHITECTES, xxviii). Representations of these with many houses dating from early in XV cent. (a few of which still remain). have been given in DE LA QUÉRIÈRE, *Descr. des Maisons de R.*, 8vo., 1821; FARIN, *Hist. de la ville de R.*, 3rd edit., 4to., 1738; PUGIN, *Ornamental Gables*, 4to., London, 1831; JOLIMONT, *Edifices de R.*, 1822; LANGLOIS, *Des. hist. des maisons de R.*, 2 vols., 8vo., 1821: LENOIR, *Maisons de R.*; BERTY, *La Ren. mont. en France*, 4to., Paris, 1864, pl. 32-5; GAILHABAUD, *Monuments, etc.*, 4to., Paris, 1850, iv; GAILHABAUD, *Arch. du Vme., etc.*, 4to., Paris, 1858, iii; NODIER ET TAYLOR, *Voy. Pitt.*, 1820-25; ROUYER ET DARCEL, *L'Art Arch.*, 4to., Paris, 1863-66, i, 13; BUILDER *Journal*, 1857, xv, 526, 703, 723, examples dating 1598, 1620, 1637, etc.; MONITEUR DES ARCHITECTES, xxxii, 373-6.

The donjon tower, forming part of an Ursuline convent in rue Morand, is the only part remaining of the château, built 1205 by Philippe Auguste, and destroyed 1590; it is also called tour de Jeanne d'Arc; and perhaps Bigot's tower, of which plans are given in NODIER; the walls are 13 ft. thick; it was restored by Viollet le Duc, *cir.* 1870. BOUGUET, *Notice hist., etc., sur la donjon, etc.*, 8vo., Rouen, 1877. La haute vieille tour, now the cloth hall, seems to have formed part of the ancient palace.

Before the revolution there were thirty-seven parish churches, besides numerous other churches attached to ecclesiastical establishments; there are now only twelve parish churches, two succursales, a protestant church, and a synagogue. Every church had been scraped or restored before 1861 (B. *J.*, 1868, xxvi, 77). The cathedral dedicated to *Nôtre Dame*, was perhaps commenced 1200 under the direction of Enguerrand or Ingelramme, who 1212 was succeeded by Durandus, whose name appears on the first and earliest of the bosses; G. de S. Hylaire was "magister operis" 1251. The (north or) tour de S. Romain *cir.* 1240-60; side doors end of XII cent.; north doorway *cir.* 1278 by J. Davi, who also formed the reservoir for the fountain of the cathedral; the transepts begun 1280; the choir 1280-1300; DEVILLE, *Revue*, 18, attributes to Davi the lady chapel which was pulled down 1302 and rebuilt by 1366; the north and south fronts are XIV cent. (decorated with geometric tracery) having two fine rose windows; the chapels of choir ailes have fine XIII cent. glass; the grand portail and rose window 1370 by J. Perier; succeeded 1388 by J. de Bayeux; by J. Rouxel, 1447-52; by G. Richier, master of the works 1452-62; and by G. Pontifz who added 1463-7 or 77 the upper story to the north tower, and the (south or) tour de Beurre 1485, which was completed 1506 by J. le Roux; Pontifz also 1477-79 executed the chapter library with its stone staircase in north transept (BRITTON), 1467 the elaborate carved stalls and the *clôture* of the church, and of the sacristy 1477-9, with its wrought iron door. The great central doorway and whole of upper portion rebuilt for cardinal d'Amboise (1507-30) by R. le Roux, Pierre le Galloys, master mason, and Jehan le Boucher (DEVILLE, *Revue*, 51); restored 1833-42; the portail des libraires (north) 1481, restored by Desmarets and Barthélemy with great skill (BRITTON). The central spire destroyed 1822 was replaced by one of cast-iron by J. A. Alavoine, continued by Dubois and Pinchon; the upper 20 ft., was still on the ground (B. *J.*, 1866, xxiv, 783) in 1874. The marble tomb 1518-20 or -25 by R. LE ROUX to George, cardinal d'Amboise, archbishop of Rouen (GAILHABAUD, *Monumens*, iv; NODIER, p. 48; GENDRE, *Vie de card. d'Amboise*, 4to., 1724): the white and black marble tomb to Louis de Brézé, husband of Diane de Poitiers, 1535-44 (design attributed to de l'Orme) is by Jean Goujon, assisted by N. Quesnel; and also attributed to Jean Cousin (ROUYER ET DARCEL, i, 18, and three plates). POMMERAYE, *Hist. de la Cath.*, 4to., 1686. DEVILLE, *Tombeaux de la Cath.*, 8vo., Rouen, 1837. GILBERT, *Descr. hist. de la Cath.*, 3 pl., 12mo., 1837. LANGLOIS, *Notice sur l'incendie*, 15 Sept. 1822, 8vo., 1823. LANGLOIS, *Stalles de la Cath.*, 1838. RICHARD, *Stalles de la Cath.*, 8vo., 1838. LABORDE, *France Mont.*, fol., pl. 196-7. FALLUE, *Eglise Metrop.*, 4 vols., 8vo., 1805. VIOLLET LE DUC, *Dict.*, ii, 362.

S. Ouen. First stone of fifth church laid 1318; the choir with its chapels and great part of transepts erected in twenty-one years (architect unknown), all on one plan, in one style, of indurated grey chalk with flints. The transepts completed 1439-40 by Alex. Berneval who, as "maistre des œuvres", is supposed to have designed the pillars of the central tower; the south transepts or upper part including the rose window, and the north rose window having the pentalpha (which is traditionally attributed to a pupil) were continued by his son Colin who succeeded him: the nave and tower begun 1490; west front about 1515-45 the two flanking towers set diagonally and carried up only for 50 ft., with three deep set portals, were pulled down, rebuilt square, and completed 1846-52 by Viollet le Duc, who did not follow the original design still preserved in the library. Abbé Bohier 1491-1515 arranged many important constructions and finished the nave; and the abbatial residence XVI cent.

(Du Sommerard, *Album*, ser. 9, pl. iv), which was rebuilt by J. P. Defrance; completed 1780 by J. B. Lebrument, and demolished 1817. The church was under restoration 1832 by C. F. Maillet de Boullay. All the glass is painted. The pulpit 1861 is by Desmaret. Attached to the church is a very perfect Norman tower XI cent. The pretty public garden on the north side was originally the convent garden. Plan in Nodier, etc., *Normandie*. Pommeraye, *Hist. de S. Ouen*, fol., 1662, which gives the fine jubé, destroyed 1789. Gilbert, *Descr. hist. de l'Eglise de S. Ouen*, 8vo., 1822. Britton and Pugin, 1828 and 1874. D'Agincourt, *Architecture*, pl. xli, figs. 2 to 7. Laborde, *France Mont.*, fol., pl. 198.

S. Maclou, begun 1432 by P. Robin; (J. le Roux *cir.* 1485) winding staircase to organ loft 1518-9 (Britton) near west entrance (Nodier); triple porch XV cent. (Sommerard, *Album*, 5, pl. 3; text v, 39); the nave has only three bays; the unrivalled carved wood doors *cir.* 1540-2 by Jean Goujon (probably aided by Nicholas Quesnel), with two Corinthian columns carrying the buffet d'orgues (in Rouyer, i, 24; Nodier, etc. pl. 152; Berty, *L'Art Ren.*, i, pl. 50; casts in South Kensington Museum, *Catalogue*, p. 40; Moyen Age Pitt., pl. 98-9; du Sommerard, *Album*, ser. 3, pl. 18-20). The tower finished about 1512; stone spire removed 1705, was rebuilt 1867-9 by M. Barthélemy. (Jolimont, *Eglise;* Lacroix, *Hist. de l'Eglise*, 8vo., 1846). The cloisters are now a hospital. The Cimetière in Berty, pl. 50. *S. Gervais*, the oldest church, has been rebuilt in the Roman style, except the Norman apse (Nodier), and the plain crypt, *cir.* 386 having Roman tiles in the walls. *S. Vivien*, restored XV and XVI cent. *S. Godard*, XVI cent., with crypt; two painted glass windows 1506-7-22-35, 12 ft. wide and 32 ft. high. *S. Patrice*, 1535, painted glass. *S. Vincent*, XVI cent., painted glass, fine porch (Nodier); woodwork of chapel about 1515 (Rouyer, i, p. 7, 2 plates); a chapel and sacristy 1875. *S. Laurent*, with glass *cir.* 1464; tower 1490-1500. *S. Nicaise*, choir XVI cent. *S. François*, portail 1710 by Nicolas, a benedictine. *S. Paul*, *cir.* 1820 by C. F. Maillet de Boullay. *S. Sever*, 1858-61 by Vachot. *S. Madeleine*, completed 1781 by Lebrument. *S. Romain*, *cir.* 1676. *S. Nicolas* (Nodier). Tower of demolished church of *S. André*. Ruins of the abbey of *S. Amand*, end of XIV cent. and 1532 (Renaissance, Nodier, p. 71); wainscoting of one room removed (Burges, *Arch. Drawings*, pl. 56); elevation and chimney piece, Britton, pl. 57-8. *Chapelle de S. Romain*, of two stories, rebuilt 1542-3 in front of the halle aux toiles (Building News *Journal*, 1859, v, 238; Berty, ii, pl. 41).

Hotel de ville (Italian) formed part of the great Benedictine monastery; (window furniture in Burges, *Arch. Drawings*, pl. 60; and Building News *Journal*, 1870, xix, 312). A new design by Le Carpentier was commenced 8 July 1758, and stopped when 6 ft. above ground on account of the expense (Le Carpentier, *Recueil des plans, etc., du Nouvel Hôtel de Rouen*, 6 pl., fol., Paris, 1758; and in Patte, *Mons.*, 1757, pl. 35-8); restorations *cir.* 1800 by C. Cochet; and others *cir.* 1815 by P. J. Delespine; front of Corinthian columns *cir.* 1820 by C. F. Maillet de Boullay: it contains the public offices, picture gallery opened 1809, and public library of 111,000 vols. and 3,000 MSS. The musée d'antiquités founded 1833-4 occupies the suppressed convent Ste. Marie, and has a fine collection of stained glass in fifteen windows. *Palais de Justice* began 1493-9 by Robert Ango for Louis XII; P. Dessaulbeaux was much employed at this time in great works; left wing or salle des procureurs 1493 as an exchange, or salle des pas perdus, 150 ft. long by 50 ft. wide, or 153 ft. by 57 ft. (Britton), with open roof (Rondelet, *L'Art de Bâtir*, etc., supp. by Blouet, pl. 45). The body of the edifice *cir.* 1499-1509 as cour d'échiquier of Normandy, by Roulland le Roux (Rouyer, i, 14); salles des assises or former chamber of parliament, 84 ft. 6½ ins. by 43 ft. 8 ins. by 21 ft. 7 ins. high (Builder *Journal*, 1846, iv, 475,) with two ceilings (restored by Viollet le Duc), beginning of XVI cent. All were restored 1859-63 to pristine excellence by — Grégoire, who added the right wing or courts of justice 1842-52, and all completed by him 1861. Behind is the supreme court, the former residence of the president of parliament. (Building News *Journal*, 1866, xiii, 817. Nodier, i, p. 86; pl. 164-5. Britton and Pugin. Du Sommerard, *Atlas*, ch. 4, pl. 4. Moyen Age Mont., pl. 36; 86. Millin, *Ant. Nat.*, iii, art. 31, pl. 4, and No. 2).

Archiepiscopal palace 1461 (two turrets in Britton); entrance door by Mansart; restored *cir.* 1876; hôtel Dieu 1749 and later; its church 1767-81 by J. B. Lebrument (Krafft, *Charpenterie*, 1805, pl. 15-6. Dadre, *Chron. hist. des Archevesques de R.*, 12mo., 1618). Exchange 1735; restored *cir.* 1870. Custom house 1835-48 by E. Isabelle, replacing the one *temp.* Louis XV, carved by one of the Coustou (Builder *Journal*, vii, 546-7). Abattoir (Ger. *schlacht-hof*) 1834-36 by Dommey (Allgemeine Bauzeitung, 1846, pl. 7-11, p. 40-9). The *halles*, end of XIII cent., were the largest and finest in France; that of the merchants is 272 Fr. ft. by 50 ft.; the drapers and for wool, each 200 ft.; for corn 300 ft. (Britton and Pugin, p. 25). The markets, 1860. Théâtre des arts 1775-6 by F. Guéroult, salle restored 1859 holds 2,000 persons; théâtre Français, 1793. Waterworks 1869 described Building News *Journal*, xvi, 268. Rouen and Havre railway, J. Locke, engineer, opened 20 March 1847, timber bridge of eight arches, each 132 ft. span, over the river Seine, the Barentin viaduct, etc., Illustrated London News, 1847, x, 204. Rouen and Amiens railway station, cylinder foundations, Builder *Journal*, 1866, xxiv, 124. Le Gras, *Les deux hospitaux*, et l'Asile des Aliénés, 8vo., 1827.

Licquet, *Rouen, etc.*, 12mo., 1856, gives a list of publications; Lenglet du Fresnoy, *Méthode*, 4to., 1735, iv, 200, etc.; and Ramée, *Manuel*, 12mo., Paris, 1843, ii, 341. Puiseux, *Siège et prise de R. par les Anglais en* 1418-19, *publiés sur des Documents nouveaux ou peu connus, etc.*, 8vo., pl., 1860. Cheruel, *Histoire de Rouen, sous la Domination Anglaise au xv siècle*, 8vo., Rouen, 1840. Jolimont, *Les princ. Edifices de R. en* 1525, 48 cold. pl. 1845-7. Deville, *Revue des Architectes, etc.*, 8vo., R., 1848. Joanne, *Guide*, 12mo., Paris, 1866. Charnet, *Hist. de R. de* 1150 *à* 1382, 8vo., 2 vols. Winkle, *French Cathedrals*, 8vo., 1837. Chapuy, *France Mont.*, pl. 1, 9, 21. Millin, *Ant. Nat.*, 1791, iii, No. 31. Viollet le Duc, *Dict. Raiss.*, index, 8vo., 1858-68, Dawson Turner, *Tour in Norm.*, 8vo., Lond., 1820. Jolimont, *Mons. les plus remarquables, etc.*, fol., 1822; and *Vues des Mons. du Calvados*, 4to., 1825. Cotman, *Arch. Ant. of Normandy*, fol. 1820-25. Gally Knight, *Arch. Tour in Norm.*, 8vo., 1836. Nodier et Taylor, *Voyages Pitt., Normandie*, fol., Paris, 1820-5. *Rouen illustrated*, 20 etchings by Brunet-Debaine, Adeline, and others, fol., n.d.

Britton and Pugin, *Normandy*, 4to., London, 1828; new edit. by Spiers, 1874. Norman Shaw, *Architectural Sketches*, fol., 1858. Johnson, *Early French Churches*, fol., Newc., 1864. Stephens, *Normandy; its Gothic Arch., etc.*, 25 photos., 4to., 1865. Daly, *Revue Générale*, 1842, iii, gives 226-8; 312-22, an article on *Rouen* by F. de Guilhermy; and 1844, v, 419-31, 538-56, by H. Janniard, giving pl. 22 the timber roof of S. Ouen. See also *Index* to the work. Builder *Journal*, 1863, xx, 472. Civil Engineer, etc., *Journal*, 1852, xv, 82, remarks by J. P. Seddon; and 1864, xxvii, 317-9.

Near the town are; the chapelle Nôtre Dame de Blosseville Bonsecours (XIII cent.), rebuilt 1840-42-54 by — Barthélemy, and richly decorated. Darnétal and its fine restored church of Long Paon XVI cent. (Nodier), and the restored tour de Carville, before Henry IV. Templars' church (until 1789) at Ste. Vaubourg. Chapel of S. Julien 1183, Inkersley, *Rom. Arch. in France*, 8vo., 1850, pp. 11, 58, 162. 1.

ROUEN (Jérôme de), or Ruam, early in XVI cent., Maria, daughter of king Emmanuel of Portugal, confided to him the construction of the fine church at Luz near Lisbon; Raczynski, *Dict.*, p. 253, Dussieux, *Les Arts Franç.*, 1856, p. 394.

ROUEN WHITE. A terrene white, not of much value. 9.

ROUGE ROYALE, rouge fleuri, rouge griotte, rouge de Sicile,

are all marbles of Belgium; the common kinds are sometimes called Flemish marble.

ROUGH CAST (Fr. *crépis, moucheté; fouetté* (25); Scot. HARLE or harling). In the country, for the exterior coating of common dwellings and outbuildings, a species of plastering is used called *rough cast*, a composition of small gravel, finely washed, to free it from all earthy particles, and mixed with lime and water in a state of semi-fluid consistency. The wall is first pricked up with a coat of lime and hair, on which, when tolerably well set, a second coat is laid on of the same materials as the first, but as smooth as possible. As fast as the workman finishes this surface, another follows him with a pailful of the rough cast, with which he bespatters the new plastering, so that the whole dries together. This is thrown from the pail upon the wall, with a wooden float, about 5 or 6 ins. long and as many wide. While with this tool the plasterer throws on the rough cast with his right hand, in his left he holds a common whitewasher's brush dipped in the rough cast, with which he brushes and colours the mortar and the rough cast already spread, to give them, when finished, a uniform colour and appearance. GWILT, *Encycl.*

This rough cast, which is attended with little trouble and expense, contributes to preserve the buildings, and the materials are cheap and the workmanship simple and easy; PARTINGTON, *Builder's Complete Guide*, 8vo., London, 1825, p. 421-2. Plastering with "rough mortar" is done (1736) in some parts of Kent (BUILDING NEWS *Journal*. 1871, xx, 501) upon old loam walls; that is one coat of rough mortar is given to the wall, though it is commonly struck smooth like lime and hair. If the wall be new and lathed and plastered with loam on both sides, a coat of this rough mortar is given on the outside. This rough cast may be wrought in 'flourishes'. CASTING. FINISHER, PARETTA or PERETTO WORK. HARLE. FREIZING. DEPRETER or DEPETER. SPARING. PLASTER WORK. 1. 4. 17. 19.

"The nave of Leiston church is covered with an original coarse rough cast, which from its so frequently accompanying early masonry, may in connection with other facts be considered an evidence of primitive construction. It is frequently found in Norman work, but there is a peculiar coarseness in that of the Saxon period, which is composed of gravel, lime, and sand, the great durability of which is attested by its preservation through so many centuries. Practical men say that the coarser the material mixed with the lime the less its strength is exhausted; a fact the early builders seem to have well understood. The impenetrable hardness of some of the rough cast plaster is extraordinary"; J. G. WALLER, in C. E., ETC., *Journal*, 1845, xiii, 302. HUNT, *Tudor Architecture*, 4to., London, 1836, p. 72, notices that this composition in later times was sometimes studded with fragments of glass, "which made a brilliant display when the sun shone, and even by moonlight." The term is used 23 Henry VIII: BAYLEY, *Tower of London*, 4to., 1821, i, App. viii. ix.

ROUGHING IN; see FIRST COAT.

ROUGH MASON; see MASON, and ROUGH SETTER.

ROUGH MORTAR. In many places in Kent where rough cast was used, a sort of sand was used which gave the lime a blood-red colour, to which powder of cinders was added, changing it to a kind of bluish colour. 4.

ROUGHNESS. *Influence of Roughness on the Flow of Water in Pipes;* BUILDING NEWS *Journal*, 1879, xxxvi, 645, quoting HERING, *on Flow of Water in Small Channels*, in *Trans.* of American Society of Civil Engineers.

ROUGH PLATE GLASS; see GLASS; and PLATE GLASS. 1.

ROUGH SETTER. A mason who only built with rough or hammered stones, in contradistinction to the freemason, or worker of carved or wrought stone. HORWODE. 19.

ROUGH STONE. Stone as it comes out of the quarry; KENTISH RAG. RUBBLE.

ROUGH STUCCO. Plastering not worked to a perfectly level and finished surface.

ROUHIER (CLAUDE), pupil of C. Métezeau in 1624. LANCE, *Dict. Biog.*, 1872.

ROUMIEU (ROBERT LEWIS), F.R.I.B.A., born 1814 in London (grandson of Abraham Roumieu, who *cir.* 1750 was employed by the duke of Gordon), became a pupil of Benj. Wyatt, and 1836-48 partner with A. D. Gough, designing works in Milner and De Beauvoir squares and neighbourhood, in Tollington park, all at Islington; 1848 the restoration of old S. Pancras church; etc. He designed 1863 S. Michael's church, Islington; schools to chapel of ease, Islington; East S. Pancras (now S. Jude's district church); and to Regent Square church; 1864 the French protestant hospital, Victoria park (ILLUSTRATED LONDON NEWS); Victoria iron works, Blackwall; Prudential Assurance office, Ludgate hill; and many warehouses. He laid out several estates near London, as 1849-52 Manor park, Streatham, Surrey, and designed its lodge with the villas fronting Croydon road (B. *J.*, vii, 163); designed or made additions 1860 to Franks' hall, Farningham, Kent (B. *J.*, xviii, 712); the Cedars, Brookshill, Fairfield, and Hillside, all at Harrow Weald, Middlesex; 1866 Priory at Roehampton, Surrey, for sir J. K. Bruce; and Priory at Wimbledon, Surrey; 1870 Whitbourne hall near Worcester; 1871 the Lymes at Stanmore; 1874 manor house at Itchell, Hampshire; restored Eastbury manor house, Essex; and Kensworth church, Hertfordshire; designed S. Mark's church and parsonage, Tunbridge Wells; reredos in Ruislip church; and messrs. Crosse and Blackwell's works near Soho square. He was surveyor to the Chartered Gas company at Becton; and to the French protestant hospital estate at S. Luke's, Old street. He died 28 June 1877. His son, Reginald St. Aubyn Roumieu, succeeds him. BUILDER *Journal*, xxxv, 691; which illustrates No. 34 Eastcheap and Nos. 48 and 49 Cheapside.

ROUND OR ROUND MOLDING; see TORUS; *Tondino* in *Vignola, or the Complete Architect*, by MOXON, 8vo., 1866, p. 24.

ROUND ARCH. The following note is curious. Jacopo 1228 at Assisi, instead of pointed, "raised round arches on the upper supports between the apsis and the principal chapel, as considered of greater strength"; VASARI, *Lives*, 8vo., London, edit., 1850, i, 52.

ROUND ARCH STYLE. The name given to the Lombard, Rhenish, and Norman architecture. By far the larger proportion of mediæval works in Italy are Lombard or Romanesque, and to the very latest, this style was the favorite, as even Renaissance details are grafted on to Lombard forms in many edifices in much the same way as is the Pointed Gothic, with this difference that the Gothic failed to effect any permanent change (for even during its influence purely Lombard buildings were carried out), whilst the Renaissance rapidly vanquished the earlier style, and eventually replaced it entirely. The Italians never thoroughly comprehended or enjoyed the Pointed style. In almost all the works of the XIII cent. the favorite round arch of the pure Lombard or Romanesque character is found so mixed with the Pointed as effectually to destroy the character of the building as a *pure* first Pointed. At Pavia, Padua, Piacenza, Orvieto, Siena, and elsewhere, the round arch is as much used as the Pointed in the same building; even at Vercelli showing English influence, there is not a Pointed arch to be seen in the exterior; while at Orvieto, and Sta. Maria at Siena, the round arch overpowers the Pointed both inside and outside. This preponderance of the round arch, the prevalence of the horizontal line, the absence of bold projecting buttresses, and the general flat character of the tracery and projections, the flat pitch of Italian roofs rendering apparent the gross inconsistency of the high-pitched gables at Siena, Orvieto, Assisi, etc., all tend to show that pure Gothic never obtained a real footing in Italy. *J. M. L.

"Half the merit of the old round arched Gothic cathedrals on the Rhine consists in their solidity and the repose they display in every part. Their wall and other essential parts are always in themselves sufficient to support the roofs and vaults, and no constructive contrivance is seen anywhere; but when the Germans adopted the pointed style, their builders—they cannot be

called architects—seemed to think that the whole art consisted in supporting the widest possible vaults on the thinnest possible pillars, and in constructing the tallest windows with the most attenuated mullions."—FERGUSSON, *History of Arch.*, 8vo., London, 1865, i, 17.

METZGER, *Formenlehre zur Rundbogen Architectur*, fol., Munich, 1851. *Disuse of the Round Arch Styles;* BUILDING NEWS *Journal*, 1871, xx, 235. ARCH.

ROUND CHIMNEY; see CHIMNEY and SHAFT.

ROUND OR CIRCULAR EDIFICES; BAPTISTERY. ICE. OVAL; OCTAGON; HEXAGON; DODECAGON; BUILDINGS.

Almshouse, 1593 at Bolton.

Chapel. Rome; near the porta Sebastiana; LECLÈRE, *Recueil, etc.*, fol., Paris, 1826, pl. 40. In S. Giovanni a Carbonari, by G. Santa Croce. Madonna del Riscatto on the river Metauro at Castel Durante 1464, by D. Lazzari (Bramante).

ROUND CHURCH. It has been customary to ascribe the round churches (especially those of England), if not to the military orders, at least to the Crusaders, and to regard such churches as imitations of the church of the Holy Sepulchre at Jerusalem, as at Perpiñan *cir.* 1019, unless Charlemagne set the example. VOGUÉ, *Temple de Jérusalem*, fol., Paris, 1864, p. iv. FREEMAN, *Hist., etc., Sketches*, 8vo., 1876, p. 184. Besides the circular edifices which had been converted into, or built as, churches before the first crusade, such as the Pantheon, now Sta. Maria Rotondo; the temple to Bacchus, as it has been called, now Sta. Costanza; and S. Stefano Rotondo, all at Rome; Sta. Maria Maggiore at Nocera; and S. Salvatore at Terni; there were many other circular buildings left by the ancients in places where they were not unlikely to serve, like the round temples of Italy, as models for edifices of a date so early as the tomb of Theodoric at Ravenna, now called Sta. Maria della Rotondo. One of the most remarkable churches of this class is that at Rieux de Mérinville in France, which is circular on the exterior, but a polygon of fourteen sides internally, about 57 ft. 6 ins. diam.; it has not been edited; MERIMÉE, *Notes*, 8vo., Paris, 1835, p. 449.

List of round churches *additional* to those which, being domical, are named s.v. Dome.

Jerusalem; Church of Holy Sepulchre.
Athens; several old Greek churches; COUCHAUD, *Eglises.*
Mistra; churches of the Virgin and of S. Nicolas.

Rome; Sta. Giovanni in fonte, the baptistery to S. Gio. Laterano. S. Stefano Rotondo. S. Teodoro. Sta. Maria ad Martyres. S. Bernardo, nave antique, chancel added. Temple of Vesta, now Sta. Maria de Sole; D'Agincourt, *Arch.*, pl. 73, No. 7.
Pisa; S. Giovanni, 1153, baptistery, by Diotisalvi de' Petroni.
„ S. Sepulcro. *cir.* 1153, church of the Templars, by Diotisalvi de' Petroni (query octagon).
Como; Baptistery, *cir.* 1470, by D. Lazzari.
Perugia; S. Angelo, v or VI cent., restored 1803.
Lecce; S. Giovanni (perhaps K. T.), like S. Stefano Rotondo at Rome (28).
Brescia; in campo santo, by — Vantini: and the duomo vecchio.
Monza; S. Gerardo (late).
Ghisalba, near Bergamo, 1836, by L. Cagnola.
Verona; Madonna di Campagna, near, commenced 1558. M. Sanmichele?
Genoa; S. Sisto, by — Pellegrini.
Brindisi; Holy Sepulchre, like Cambridge.
Bologna; San Sepolcro.

Orleans; Protestant church, 1836, by F. N. Pagot, 47 ft. 3 ins. NORMAND, *Paris Moderne*, 4to., 1845, ii, fol. 279.
Quimperlé (Finisterre); Ste. Croix, XI cent.
Chauvigny (Poitou); S. Sépulcre.
Neuvy S. Sépulcre (Indre), *cir.* 1170. *Archives*, etc.
Rieux Minervois (Aude), late XI cent.
Rieux de Mérinville (Carcassone), 14 sides inside. NODIER, *Languedoc*, pl. 136 bis.
Charroux (Poitou); HUGO, *France Pitt.*; DE CAUMONT, *Cours d'Antiq.*, pt. 4, p. 162, and plates, supposed copy of that at Jerusalem.
S. Riquier (Ponthieu); *cir.* 800, by Theodulphus of Orleans.
Germiny (Loiret?); *cir.* 800, by the same, after that at Aachen.
Entraigues (Cherente); S. Michel, XII cent. VIOLLET LE DUC, s.v. Eglise.
Cambray; S. Sépulcre. Abbeville. Montdidier. Montmorillon. S. Omer. Caen. Rouen. Annecy.

Joigny; Holy Sepulchre of church of S. John.
Champigny; Chapel of Holy Cross of Jerusalem.
Perpiñan; bishop Berengarius II, 1019, visited the Holy Sepulchre, and on his return built a church like it in the city.
S. Denis; église de l'Annonciade, by H. Mansard.
Chaillot; S. Marie, by F. Mansard.
Paris; S. Marie, near porte S. Antoine, by F. Mansard; MAROT (le petit).
„ église de l'Assomption, near porte S. Honoré, by — Errard.
„ Church of Holy Sepulchre, built XIV cent. for pilgrims.
Riez; PULLAN and TEXIER, *Byzantine Arch.*, fol. 1864, pl. 10.
Lauleff or Lanseff (côtes du nord), end XI cent.; NODIER, etc., *Bretagne; Handbook to France.*
Dijon; S. Benigne, church or baptistery, destroyed 1793.
Tours, near; over tomb of S. Martin, oblong nave, by Perpetuus. CIVIL ENGINEER, ETC., *Journal*, iii, 143. Eglise de l'Annonciade, by J. le Mercier.

Marienburg (Bavaria); oblong chancel, in fortress.
Fulda, upon the Michaelsberg; original portions finished 822.
Almeno; OSTEN, *Bauwerke*, pl. 43-6.
S. Egiden, Austria (probably Templars'); Inzersdorf, 1820, for duke Herzog von Corigliano; Scheiblingkirchen, S. Magdalen, of great antiquity; Pulkau chapel, ditto; Schongraben, a half rotonda with Templars' tombs, and large church added; Busto Arsizio, near Milan, by Bramante; Znaym, Moravia, near old Castle, originally a heathen temple; and chancel of S. Nicolas parish church. TSCHISCHKA, *Kunst, etc.*, 8vo., Vienna, 1836, quoting for the last, PITTNER, *Gemälde, etc.*, in baron HORMAYR, *Archiv*, 1822, No. 71.
Metz; église de l'abbaye royale de S. Louis, by J. F. Blondel, *Cours*, 8vo. Paris, 1771, p. 321-3.
Munich; Trinity church, formerly Carmelite nuns, 1704-14.
Regensburg, Befreiungshall, near; by Gaertner, completed by L. von Klenze; light, 25 ft. diam.
Wurzburg; Castle church.
Prag; two small churches; church in Wischerad.
Weilburg. Standorf. Trier. Bonn.

Cambridge; S. Sepulchre, end of XII cent. (no order).
Northampton; S. Sepulchre, end of XII cent.; restored 1861-7 (no order).
Ludlow; church in castle, in ruins, end of XII cent.
Little Maplestead; XIII cent. (Hospitallers'); WALLEN, *Church, etc.*, 1836.
London; the Temple, dedicated 1185 (Knights Templars'); BILLING, 1838.
Temple Aslackby, Lincolnshire; end of XII cent.; in ruins.
Temple Bruer; ASSOC. SOCIETIES, *Reports, etc.*, 1873, p. x.
Bowmore, co. Argyle; Parish church.
Newcastle-on-Tyne; All Saints; interior.
The Girth House, Orkney, near the ruins of the palace of Jarl Paul, who resided there XII cent.; the type believed to be unique in North Britain; in general plan resemble the little church at Altenfurt, near Nuremberg. No church of this form exists in Ireland. BUILDER *Journal*, 1862, XX, 66. At Orphin, Orkney; PETRIE, 8vo., 1861; in ARCHÆOLOGICAL JOURNAL, iii.

Salamanca; S. Marcos; STREET, 90, pl. 4.
Segovia, dated 1208 (Templars'); STREET, p. 184.
Oporto; Church of Mostiero del Serra, 1540; imitation of Sta. Maria Rotondo at Rome.
Madrid; Sta. Francesca el Grande, 1761-90, by F. de la Cabezas and by Plo; 117 ft.
Badajoz; S. Gabriel, 1768-90.
La Vera Cruz; Templars' after model of Jerusalem.
Montefrio, *cir.* 1780, by D. A. Lois Monteagudo.

Waterloo.
Liège, 1627, by B. Flemalle, Dominican.

Island of Bornholm.
Bergen (papier mâché), BUILDING NEWS *Journal*, 1869, p. 459.
Oster-Lars, Denmark; FERGUSSON, i, 664. Thorsager.

JAMES, *On Round Churches*, read at Northampton Architectural Society, in ASSOCIATED SOCIETIES, *Reports and Papers, etc.*, 1860, p. 268-79; BUILDER *Journal*, 1860, xviii, 623: 634: and CIVIL ENGINEER, *etc., Journal*, xxiii, 300. WALLCOTT, *Church and Conventual Arrangement*, at Royal Institute of British Architects, 1860-61; and 8vo., London, 1861: and WALLCOTT, *Sacred Archæology*, 8vo., 1868, p. 518. POOLE, *S. Sepulchre, Northampton, with reference to the Restoration*, CIVIL ENGINEER, *etc., Journal*, 1852, xv, 123-5. OKELY, *Development of Christian Arch. in Italy*, 8vo., London, 1860, p. 34. RAMÉE, *Manuel de l'Hist. Gén. de l'Arch.*, 12mo., Paris, 1843, ii, 76-80. ESSEX, *Round Churches*, in ARCHÆOLOGIA, 1782, vi. BRITTON, *Essay towards a History of Temples and Round Churches,*

in *Architectural Antiquities*, 4to., 1805. *The Dome*, Scott, *Lectures*, 8vo., London, 1879, ii, 229-89. Pullan and Texier, *Byzantine Arch.*, fol., 1864, p. 93: *Temples in Italy and Gaul.* Lucas, *Les Temples et les Églises Circulaires d'Angleterre*, 8vo., Paris, 1871 (Builder *Journal*, xxx, 181). Isabelle, *Les Édifices Circulaires*, fol., Paris, 1855; and *Parallèle des Salles Rondes de l'Italie*, fol., Paris, 1863. Hubsch, *Altchristlichen Kirchen*, fol., Carls., 1862-4. Architectural Association of London, *The Domed Churches of Chirente*, 4to., London, 1882.

ROUNDEL. In glass, see Grisaille.

ROUND HEAD NAIL or TACK. A nail formerly used to fasten on hinges where a neat head was required. 4.

A similar nail is used by upholsterers to edge leather, or woven fabric covering of furniture; and also by coffin makers.

ROUND ROOM, HALL, etc.; see Rotunda.

ROUNDS. A term used among masons for the broken pieces of statues. 4.

ROUND STAIR; see Vice and Vis.

ROUND TEMPLE; see Ædes. Round cave temples in India; Fergusson, *Indian, etc., Architecture*, 8vo., London, 1876, p. 167, 203, 417.

ROUND TOMB. Of Selva, at Catania; Faso, *Sicilia*, v, pl. 14 Of Juba II (died B.C. 33), near Algiers, 141 ft. diam., 131 ft. high; Donaldson, Royal Inst. of Brit. Architects, *Sessional Papers*, 1876-7, p. 34: and the medracen near Batna; Lewis, *Algeria, idem*, 1868-9, p. 64. Of Hadrian, at Rome. Of Helena, or of SS. Peter and Marcellinus, and of Cecilia Metella, both near Rome; Isabelle. Of the rois de Valois at S. Denis; Marot (le petit). Of Alaric or Theodoric at Ravenna.

ROUND TOWER of Ireland. The first writer who mentions such structures is Giraldus Cambrensis, who calls them 'ecclesiastical towers', and saw one erecting 1185. The round towers of Ireland, of East Anglia, and of Ravenna; the latter are later than Charlemagne (768-814) as Agnellus, soon after, mentions the basilicas but not the bell towers; Freeman, *Hist. Sketches*, 8vo., 1876, p. 51. The round tower doubtless comes from Ravenna; the Pisan tower is a Ravenna tower glorified; *idem*, p. 114. Ancient documents recorded the erection of round towers from v to xiii cent., and the annals showed that from vi to xiv cent. they were used for 1, belfries; 2, depositories for reliques, church valuables and records; 3, sanctuaries; 4, places of retreat from fire or sudden inroad of an enemy; and 5, excavations in many towers have proved the existence of human skeletons. "My decided conviction of the date and use of the towers is, that they are in their origin pre-christian; that they were sepulchral and monumental; that they were used by the early christians as belfries when bells came to be used in Ireland; and that they were in many instances altered and repaired"; R. R. Brash, June 1861. "The round towers of Ireland, conspicuous in their structure and size, have been rendered still more conspicuous by a wild literature that has carried them into the regions of horrible heathen rites, superstitions, and vices. But they present the details of the Gothic or Norman architecture of the eleventh century, and are merely to be held as an eccentric type of ecclesiastical architecture, raised under some peculiar influence that has as yet escaped discovery"; Burton, *History of the reign of Queen Anne*, 8vo., London, 1880, iii, 150. 2. 6. 14. 15. 19.

T. D. Corcagiensi (hiberno), *De Antiquitate Turrium Belanorum Pagana Kerriensi, et de Architecturâ non Campanilis Ecclesiasticæ*, 8vo., Lovanii, 1610. Stevens, *Monasticon Hibernicum*, 8vo., London, 1722. Ware, *Hist. and Antiq. of Ireland*, 2nd edit. by Harris, fol., 1739-64, 2 vols.; 3rd vol., 1746. Vallancey, *Collectanea de Rebus Hibernicis*, 7 vols., 8vo., 1770-1804, vol. vi. O'Halloran, *Intro. to the study of the History and Antiq. of Ireland*, 4to., 1772. Ledwich, *Antiq. of Ireland*, 4to., Dublin, 1789-90; 1804. King, *Munimenta Antiqua*, fol., London, 1799-1805, iv, 243. Hoare, *Tour in Ireland*, 8vo., 1807. Montmorency-Morres, *Origin and prim. use of the Irish Pillar Tower*, 4to., 1821. Brewer, *Beauties of Ireland*, 2 vols., 8vo., 1825-6. Bell, *Prize Essay on Gothic Arch.*, 8vo., Dublin, 1829. D'Alton, *Ancient History, etc., of Ireland*, 1830 (Roy. Irish Acad., xvi). O'Brien, *Round Towers of Ireland*, etc., 8vo., 1834. Harmer, *On Round Towers in Ireland*, in Archæologia, ix. Wilkinson, *Practical Geology and Arch. of Ireland*, (32 towers), 8vo., 1845. Petrie, *Eccles. Antiq. of Ireland*, etc., 8vo., Dublin, 1845. Wakeman, *Handbook of Irish Antiq.*, 12mo., 1848. O'Neill, *Fine Arts, etc., of Ancient Ireland*, 8vo., 1863. Beaufort, *State of Arch. and Antiq. previous to the landing of the Anglo-Normans in Ireland*, Royal Irish Academy, *Trans.*, xv. Keane, *Towers and Temples of Ancient Ireland*, etc., 4to., Dublin, 1867. Quin, lord Dunraven, *Notes on Irish Architecture*, edit. by M. Stokes, 2 vols., fol., London, 1875-77, p. 147-188.

Fergusson, *Handbook*, p. 7, etc., 415, 420, 719, 722. Fergusson, *Rude Stone Monuments*, 8vo., 1872, p. 271; and *The Brochs, etc., of Orkney*, 8vo., 1877. Waring, *Stone Monuments*, 4to., 1870.

Society of Antiquaries, two Indexes. Anthologia Hibernica, 8vo., 1793, i, 81-92. Royal Irish Academy. Ulster Journal of Archæology (9 vols., Belfast, 1853-62), vii, 155, gives Brash, *Notes on the R. T. controversy;* and 1860 or 61, *The Belfry theory examined.* Kilkenny Archæological Society, *Transactions*, 1, 2 and 3 ser., 1849-68, etc. Hitchcock, *On the Kerry Round Towers*, 1853. Notes and Queries *Journal.* Gordon M. Hills, *Review of the Arch. and History of the R. T. of Ireland*, read at Roy. Inst. of Brit. Architects, *Sessional Papers*, 11 January 1858, 120 sites, has seen 104, exhibited 77 and 5 others; also Builder *Journal*, xvi, 36 *et seq.* Dublin Builder *Journal*, by Brash, ii, 229, 246, 273; and iii, 413, 429.

Pillar Temple. Fanal du Cimetière or Cemetery Beacon. Irish Architecture (p. 41). Pharos.

In Scotland. At Abernethy, and Brechin. Gough, *R. T. at Brechin*, in Archæologia, ii; Builder *Journal*, x, 565. Society of Antiquaries of Scotland, *Transactions*, iii, pt. 2; and iv. Pennant, *Tour*, 1766, pt. 2, p. 50, and see Brechin. Wilson, *Scotland*, 583. Forsyth, *Beauties*, 8vo., Edinb., 1805-8, iv, 303; 365. Billings, *Baronial, etc., Antiq.* s. v. Brechin.

At Bhaugulpore or Boglipore (two); Brewer, *Palaces, etc.*, 175; Valentia, *Travels*, 4to., 1809, pl. iv; Dudley, *Nautogy*, 8vo., Leicester, 1846, p. 209. Mazanderam; Pictorial History of England, i, 16. Ravenna; Hubsch, *Altchrist. Kirchen*, fol., Carls., 1858-61, pl. 24. Kunawât or Kenath, in Bashan, *cir.* I, A.D.; Porter, *Giant Cities*, 1867, p. 44. Coel in Agra; Blackie, *Gazetteer.* Caschan in Central Persia, (or houses); Hommaire de Hell, *Voyage en Turquie*, etc., fol., Paris, 1853-9, pl. 97. The roof of the tower of queen Bertha of Burgundy, at Orbe, Canton de Vaud, is formed of horizontal layers of stone, and has the door midway up the building, both after the fashion of the Irish towers. Broullys, Brecknockshire; Penny Cyc., 379. Nurhag of Sardinia.

ROUND CHURCH TOWERS of Norfolk and Suffolk. A List in *East Anglian Notes and Queries*, i, 271, 298. Archæologia, 4to., 1831, xxiii. Church Builder *Journal*, 1879, p. 245. Norman architecture, (p. 37*b*; 38*a*). Norfolk Tour, 8vo., Norwich, 1829, ii, 1330. Associated Societies, *Reports and Papers*, i, 85. Building News *Journal*, 1879, xxxvii, 274; 386. Civil Engineer, etc., *Journal*, 1865, xxviii, 258. Cotman, *Arch. Etchings*, fol., London, 1818; and 1838. Woodward, *R. T. of Norfolk*, in Archæologia, xxiii. Parker, *Eccles., etc., Top. of England (Suffolk)*, 222; 232.

ROUND WINDOW; also called Rose, Marigold, Catherine wheel, and Wheel, window. (It. *oculi.*) A classification is offered in Woods, *Letters*, 4to., London, 1828, i, 128. One, 30 ft. diam. in a gable over the dais was ordered to be made 27 Henry III, 1243, in the king's hall at Dublin, which was 120 ft. long and 80 ft. wide. In 1363 Andrea di Cione advised that in the nave of Sta. Maria del Fiore at Florence, *oculi* or circular windows should be adopted instead of *fenestræ*. Round west window referred to by Schayes, 8vo., Brux., 1850-3, i, 66.

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Toscanella; Daly, *Revue Gén.*, xiv. 64.
Modena cathedral.
Como cathedral; Gwilt, *Encyc.*, 642.
Palermo; church of S. Agostino (p. 17). Monza.
Assisi, Sta. Chiara, 15 ft.; S. Francesco, 10 ft. 6 ins.; *Illustrations*, iii. pt. 3, pl. 73. The vescovato, of red and white marble.
At Passignano, a round west window with good mouldings was just finished, such as at Cortona would be called of xiii cent.; Webb, *Cont. Eccles.*, 1848, p. 378.
Spoleto, cathedral, two; and Taormino; *Illustrations*, ditto.
Pavia; Gailhabaud, *L'Arch. du Vme.*, 4to., iii.

Beauvais, north transept; south transept, 34 ft. 4 ins.
Rouen cath., 23 ft. diam.; and in S. Ouen, 29 ft. 6 ins.; and north trans., 28 ft. 6 ins.
Laon, and two others, 26 ft. in opening; one in Johnson, *Early French Churches*, fol., Newc., 1864, pl. 71; also giving, pl. 59, that at Noyon.
Chartres, three; Inkersley, 170; 295; V. de Honnecourt, *Album*, by Lassus, 4to., Paris, 1858, p. 71.
Paris, S. Chapelle. Nôtre Dame, north transept, 42 ft. diam., restored; south, restored 1725 by builder Pinel, under G. de Boffrand.
S. Pol de Leon, cathedral, magnificent.
Poitiers cath.; Auber, 1849. Auxerre.
Reims cathedral, west front, three, 1241. King, *Study Book*, 40 ft. diam.
Amiens, south transept, 29 ft. 6 ins.; north, 37 ft. 8 ins.

Lincoln, at west end, Norman; King, *Eastern Cathedrals*, p. 288, by de Noiers. Transept, 1200 and 1350.
York cathedral, *circ.* 1320.
Canterbury cathedral, unique Norman, 17 ft. diam., reset *circ.* 1820 by G. Austin.
Byland abbey, about 26 ft. diam. Winchester palace, Southwark.
Patrixbourne church, Kent. Oxford, Christ church, 1180.
London, old S. Paul's cathedral; Longman, *Three Cathedrals*.
Westminster abbey, south transept, rebuilt 1673; in 1705 13; and 1814; north transept (1245?) renewed.
Dublin, S. Saviour's church, 1858-9.
Beverley cathedral, 1220.
Berkeley church, 1320.
Stratford-on-Avon, 1350.
Bafreston, Kent, 1180.
Norwich, Charnel chapel, 1300. S. Ethelbert's gate: King, *Eastern Cath.*, frontis., and one foiled, p. 144.
Northampton, S. John's hospital, 1360.
S. David's, 1360.
Kirkwall.
Winchester, S. Cross, 1150. Boyton, Wiltshire, 1260.
Peterborough, west front; King, *East Cath.*, p. 59.
Castle Hedingham church; *Pict. Hist. of England*, i, 616, Norman.
Bristol, S. James's church; Rickman, *Attempt*, p. 60.
New Shoreham church, east end gable; Sharpe, 1861, p. 31.
Lynn, S. Margaret's church, east end; *Excursions thro' Norfolk*.

Huy; Hope, *Architecture*, pl. lxxxii.
Osnabruck, S. John's church; King, *Study Book*, 1858-68, iii, pl. 7.
Oppenheim, begun 1269.
Gadebusch church, Mecklenburg; the tracery of the west window is of bronze; Nesbitt, in Archæological Journal, 1852, ix, 348.
Nuremberg, S. Laurence, west end. Webb.
Nuremberg, Frauenkirche, east end of south aile, interesting. Webb.
Basle.
Lausanne.

Tarragona cathedral; Gwilt, *Encyc.*, 587. Burgos.

Illustrations, s. v. Rose Window; Wiebeking, *Baukunde*, 4to., 1821-6, plates at end; Gwilt, *Encyc.*, edit., 1867 and 1876; Street, *Brick and Marble Arch.*, 8vo., London, 1855, passim.

ROUSCO and Rousko; see Rusca (L.)

ROUSSEAU (Pierre), born 1750 at Nantes; a pupil of Potain, went 1773 to Rome; settled at Amiens, where he designed 1773-79 the theatre, cost 180,000 frs.; 1782-93 the halle aux grains (Normand, *Paris Moderne*, part 2, pl. 152); and 1791 the hôpital S. Charles. At Paris 1783-7 he designed the hôtel du prince de Salm-Kirsbourg, "one of the most elegant buildings in the city", added to by A. F. Peyre, and now the palace of the Legion of Honour; it has been rebuilt by Mortier since its destruction 1871. Legrand et Landon, *Édifices de Paris*, 8vo., 1808, ii, 89; Krafft, *Portes cochères*, fol., Paris, 1838, pl. 43-4; Krafft and Ransonnette, *Plans, etc., des hôtels à Paris*, fol., Paris, (1802), pl. 73-86; Krafft, *Charpente*, fol., Paris, 1805, pl. x, gives the formation of the roof of the salon. On 1 Jan. 1785 he was nominated *inspecteur des dehors* at Fontainebleau; he designed a pavilion or Chinese kiosque in the garden of hôtel Montmorency, rue Montmartre; 1791 continued the parish church of S. Germain en Laye, begun 1765 by his father-in-law Potain; and published *Projet d'un palais national, et d'une place pour le roi, etc.*, 4to., Paris, 1790. Normand, *Paris Moderne*, 4to., Paris, 1843, i, pl. 5, gives a house by him at Choisy-le-Roi, rue S. Louis. Lance, *Dict. Biog.* The date of death is not stated.

ROUSSEAU (Charles), master mason at Tours 1561 is named as master of the works to the cathedral. Lance, *Dict.*

ROUSSEL (Jean), or Jehan Rouxel, master mason at Rouen cathedral. His name occurs between 21 Sept. 1447 the death of Salvart, and Feb. 1452 when Geoffrey Richier was appointed. He reported, after the death 1440 of A. de Berneval, on the state of certain defective parts of S. Ouen: and had worked under Jenson Salvart at the old palace there erected for Henry V of England. Deville, *Revue des Arch.*, 8vo., Rouen, 1848, p. 33, Lance, *Dict.*

ROUSSET and ROUSSETTE (Pierre Noel), architect to the king; designed 1756-7 buffet d'orgues and other works at the S. Chapelle at Paris (Blondel, *Cours*, 8vo., 1771, ii, 387); two pavilions at the château de Livry; the *cuisines* at the château du Raincy (iv, 153); 1753 the maison de plaisance d'un sieur Larcher, in the île S. Denis, near Paris; redecorated the hôtel de la duchesse de Bourbon, rue Neuve des Petits Champs; completed (iii, 368) the country house of M. de Montmartel at Brunoy, designed by Boscri; the hôtel de Tessé (now Vigier) at corner of the rue des Saints Pères and quai des Théatins, now Voltaire; Rouyer et Darcel, *L'Art Architectural en France*, 4to., Paris, 1863-6, ii, pl. 93-6; and 1749 added considerably to the house of M. le Geudre d'Armini, later M. de Meulon, rue des Capucines, designed 1713 by de Cotte; Blondel, *Arch. Franç.*, fol., Paris, 1754, iii, 117, and plates. He made a projet de Place dans le quartier de la Grève, shown on pl. 39 at D, in Patte, *Monumens*, fol., Paris, 1767, p. 192; and projet pour le carrefour de Bussy, p. 205-6. In 1758 he was elected a member of the academy of architecture. C. Norry was a pupil. He died 1763. Piganiol de la Force, *Descr. de Paris, etc.*, 1765.

ROUX (Jacques le), master of the works in masonry at the church of S. Maclou at Rouen, was sent 1488 to Pont-Audemer to inspect the works to the porte de Bougerue. As master mason at Rouen cathedral he 1496 succeeded G. Pontifz, and continued the tour de Beurre, completed 1506, when he worked at the grand portail which was in a ruinous state, and presented a design, but resigned on account of age; died 27 March 1510; was buried in the nave; and was succeeded by his nephew Roulland le Roux. Deville, *Revue des Arch.*, 8vo., Rouen, 1848, p. 44-5.

ROUX (Jean Baptiste le), born about 1676, became pupil of Dorbay. He excelled in internal decoration, as at the hôtel de Brissac, by Boffrand; the gallery at the hôtel de Villars, by Lelion; restorations at the hôtel de Bonnier de la Masson, rue S. Dominique; 1733 the completion and decoration of the hôtel de Roquelaure, later Molé, rue S. Dominique, after the designs 1722 of Cailleteau (Lassurance), (Blondel, *Arch. Franç.*, fol., 1752, i, 245); 1735 the hôtel de Mazarin, later Rohan Chabot, rue de Varennes (Blondel, *Discours*, 1754, p. 66); hôtel de Montbazon, rue de l'Université (Blondel, *A. F.*, i, 215); and alterations about 1746 to the hôtel de Villeroy, rue de Varennes, designed about 1720 by Aubry Guillot for mad. Desmares (Blondel, *A. F.*, i, 212). He was 1720 a member of, and 1730 professor at, the academy of architecture. T. Sutton of London was a pupil. He died 1746, aged about 70 years. Lance, *Dict. Biog.*, states he died in 1740, aged about 69, as according to Blondel, i, 212. Blondel, *L'Homme du Monde*, 8vo., Paris, 1774, p. 295.

ROUX (Rolland and Roullant le), perhaps also called Jean Chenevières or Chennevière; 1508 directed the transport

of a marble fountain from Italy to Gaillon; 1510 succeeded his uncle JACQUES as master mason at Rouen cathedral, where he made a new design for the grand portail; and rebuilt 1514 the upper part of the central tower; 1518 went to Angers about an edifice for the archbishop of Lyon; 1518-20 designed the elaborate tomb in Rouen cathedral, to cardinal George d'Amboise, for which he received 80 frs. from the chapter, and completed it 3 Jan. 1525-6: the work had been declined by P. Valence of Tours; the master mason was P. Desaubeaulx; (*Collection of Casts*, p. 33, in South Kensington Museum, where there are casts of seventy-three pieces; DEVILLE, *Tombeaux de la Cath.*, 8vo., Rouen, 1837; GAILHABAUD, *Monumens*, 4to., iv; NODIER ET TAYLOR, *Voy. Pitt.*, p. 48). He took part in the erection of the palais de justice at Rouen. The château de Chambord attributed 1532-41 to him was designed by P. Nepveu of Blois (J. MARCHANT). He died 1527, and was succeeded at the cathedral by S. Vitecocq. DEVILLE, *Revue des Arch.*, 8vo., Rouen, 1848, p. 49, 62; LANCE, *Dict. Biog.*; DEVILLE, *Château de Gaillon*, 4to., Paris, 1850, cxiii.

ROVEHEAD (ALEXANDER), of London, is called a "celebrated architect" in TENON, *Mémoires sur les hôpitaux de Paris*, 4to., Paris, 1788; Ranchad or RONCHAD (LEGRAND, *Essai sur l'histoire générale de l'Arch.*, 1809, p. 202); also Rovehad and Ronchard (DURAND, *Parallèle*, pl. 29), and is said to have designed 1756-64 the hospital at Stonehouse, at Plymouth. The records state that Alex. Rouchard or Rouchart (the R may be B), was appointed under a minute of 10 Nov. 1756 as "overseer, and to be in constant attendance at the works", but the land had not then been purchased.

ROVEZZANO (BENEDETTO DA), born near Florence, chiefly a sculptor, designed at Florence the house near the church of S. Apostolo for Oddo Altoviti, and carved the entrance door and coat of arms in macigno stone over it; the chapel and tomb 1515-25 of S. Giovanni Gualberto for the church of the Sta. Trinità, the materials for which were destroyed 1530 in the workshops by soldiers; portions of it still exist in the public gallery: also the architecture and arrangement of the gate and vestibule of the abbey; as also several of the chapels in that edifice, among others that of S. Stefano, near the vestibule, for the Pandolfini family. He was invited to England, *temp.* Henry VIII (and there called Benedict the carver), for which king it is said he executed many works in marble and bronze; but more especially designed 1524-29 for cardinal Wolsey, the tomb in the tombhouse at the east end of S. George's chapel, Windsor. He was employed by the king to complete the same in a more sumptuous manner for himself and lady Jane Seymour (died 1537); it was nearly completed 1546, as stated in his will; and was destroyed 1646 and sold for £606; the sarcophagus of black marble was appropriated to the sepulture of Nelson. VASARI remarks that the tomb had been prepared in wood with figures in wax by Baccio Bandinelli, but cast in metal by Benedetto; who returned, liberally rewarded, to Florence, where he became blind about 1540 or 1550, and died in a few years. VASARI, *Lives*, edit. 1851, ii, 450; iii, 130; iv, 243. WALPOLE, *Anecdotes*, i, 103; and edit. Dallaway, i, 184: and edit. Wornum, i, 109. TIGHE AND DAVIS, *Annals of Windsor*, 8vo., London, 1858, i, 560. 19.

ROVIGNO or TREVIGNO (Lat. *Rivonium*). A town and seaport in Illyria. There are ten churches, including the large Gothic cathedral, dedicated to Sta. Eufemia, erected on the plan of that of S. Marco at Venice, having a lofty campanile. Its quarries furnish stone for Venice and all the neighbouring towns. 28. 50.

ROVIGO (Lat. *Rhodigium*). The capital of the province of the same name in Italy, situated on both sides of the river Adigetto, over which are four bridges. It is now the seat of the bishop of Adria. Twenty-seven churches, of which the plain cathedral, dedicated to S. Stefano martire, and the octagon church of SS. Francesco e Giustina, or B. Vergine del Soccorso; the governor's palace by Sanmichele; and two mediæval square towers, both out of the perpendicular, deserve attention. BARTOLI, *Scultura ed Archit. etc., d'Italia*, 8vo., Venice, 1776; 1793. WEBB, *Continental Ecclesiology*, 8vo., 1848. NICOLIO, *Storia di Rovigo*, 4to., Verona, 1582. ADRIA. 14. 28. 50. 96.

ROW or ROWS. Continuous galleries on the first floor on both sides of the four principal streets at CHESTER, having balustrades next the roadway, and flights of steps up from it at convenient distances, the roadway appearing to have been excavated. The term is also applied at Great Yarmouth to the narrow ways running at right angles to the principal carriage roads.

ROWLAND (THOMAS), was appointed 4 May 1715 clerk of the works at Windsor, vice James Brown, and was there in 1729, being succeeded by Abraham Curtis who held the office in 1735.

ROWLANDSON (.....), was appointed 1668 by prince Rupert, constable of Windsor castle, as surveyor of the works, and keeper of the timber yard situate on the south side of the castle. TIGHE AND DAVIS, *Windsor*, 8vo., London, 1858, ii, 333.

ROWLEY RAGSTONE. A quarry, near Dudley, in Worcestershire. It is a basalt, used for pitching and macadamizing roads. Messrs. Chance of Birmingham adopted a process of melting the Rowley rag, and then casting it into moulds for architectural ornaments, tiles for pavements, etc.: *Guide* to the Museum of Practical Geology, 1860; its manufacture is described in HUNT, *Memoirs of Geological Survey, etc.*, Mining Records, *Mineral Statistics*, 8vo., 1858, pt. 2.

ROY (JEAN), 1455 architect of Evreux cathedral; to him the *flèche* of that building is attributed. LANCE, *Dict. Biog.*

ROY (JULIEN [not Jean] DAVID LE), born 1728 (not 1734) at Paris, son of the celebrated clock maker Julien le Roy (died 1759), was a pupil of Jossenay and of A. J. Loriot. 1750 he gained the *grand prix* and went to Rome, thence 1754 to Greece from Venice, learning that Stuart and Revett had been there, as stated in their *Antiq. of Athens*, fol., London, 1762, i, pref. vi. He was 1758 member and 1774 professor of the academy of architecture, and one of the first members of the institute; member of the institute at Bologna; and is called "regie français" in the list of the academy of S. Luke at Rome (DUSSIEUX, *Art. Franç.*, 1856, p. 366). His works were chiefly literary, comprising *Les ruines des plus beaux monumens de la Grèce, etc.*, 2 vols., fol., Paris, 1758; and 1770: *Essai sur la Perspective pratique*, 12mo., 1757; *Histoire de la disposition et des formes différentes que les Chrétiens ont données à leurs Temples, etc.*, 8vo., 1764; *Observations sur les édifices des anciens peuples*, 1767; and several others relating to the marine. J. A. Renard was a pupil. He died 8 or 27 Jan. 1803 at Paris, aged 69. A medal and bust were subscribed for by thirty of his pupils. LANCE, *Dict. Biog.* 5. 110.

ROY (NICOLAS), master mason, *cir.* 1550 in Scotland.

ROY or ROI (..... LE), of Paris, where he designed a house in the rue du Mail, engraved in MAROT, *L'Arch. Françoise*, fol. (1670), pl. 44. C. Gamard 1615 made plans for the church of S. Sulpice, at Paris: Leroi 1636 made new ones, but being recalled 1643, Gamard laid the foundations of the choir. LANCE, *Dict. Biog.* 5.

ROYAL BLUE. A smalt of deep colour; see COBALT BLUES.

ROYAL CHAPEL. The erection dating from the middle of XIII cent., of the Sainte Chapelle at Paris had an influence on the chapels of the nobility, and its plan served as a type; as at the hôtel S. Pol at Paris; the Louvre; Vincennes; hôtel de Bourbon at Paris; château de Marcouci; Jacques Cœur at Bourges. Towards the end of XV cent., the plan came to follow the Greek cross, as at château d'Amboise; VIOLLET LE DUC, *Dict.*, s. v. Chapelle, p. 441, and others named in GUENEBAULT, *Dict. Icon.*, 8vo., Paris, 1843, s. v. Chapelle Royale and Chapelle Sépulcrale. The royal chapels in Westminster abbey church are perhaps the only examples in England.

In Spain there is often a *Capilla real*, and generally a parish church called the *sagrario*, opening into the cathedral, having separate priests and services.

ROYAL EXCHANGE; see EXCHANGE.

ROYAL GLASS. "Roiall glas fulfylled with ymagery", is noticed in the *Squire of Low Degree*, and supposed to mean painted glass. 19.

ROYAL PALACE; see PALACE.

ROYTELL (JOHN), a Frenchman, was appointed by queen Mary principal master mason to all his highness's (James VI) works in Scotland, with a fee, and was succeeded 18 April 1617, on his death, by William Wallace. ARCHITECTURAL INSTITUTE OF SCOTLAND, *Trans.*, 8vo., Edinb., 1851-2, ii. 25.

ROZIER (.....), 1421-50 erected the choir of the Rheinholdkirche at Dortraund. 92.

ROZZO (ANTONIO DEL), of Siena, also an engineer, learnt architecture under B. Peruzzi (died 1536). 73.

RUABON STONE. A quarry in North Wales, supplying a fine grained sandstone of an even texture, of a uniform white colour, warm tint, easily worked, and a thorough weather stone. It is also a first class fire stone, being of the same series as the Minera, Wrexham, and Cefn stones. It was used at the savings' bank at Chester 1858 by James Harrison; and was delivered in London in 1877 and earlier. MINERA STONE.

RUAM or ROUAN (JÉRÔME DE); see ROUEN (J. DE).

RUBBED RETURN, HEADER and STRETCHER BRICK. Bricks rubbed on a "rub stone", which is round, and about 14 ins. diam., more or less at pleasure. Bricks for mouldings are formed roughly by the axe and then rubbed on a 'float stone' to the form desired. MOXON, *Mech. Exercises* (Bricklayer) 4to., 1700, p. 9-10. 1.

Rubbed stone is in some places called 'polished'; also 'cleansed' at Leeds. Stone pavings and landings are usually rubbed for inside work. ASHLER. 1.

RUBBER (INDIAN); see CAOUTCHOUC.

RUBBING STONE; see RUBBED RETURN.

RUBBISH (Fr. *décombres*). RAMELSTONE. GALLET. Synonymous with robows 1440, robeux 1480, rubbrysshe 1519, robrisshe 1530, or chippings of stones; NOTES AND QUERIES *Journal*, 1877-8, ser. 5, viii, 423; ix, 15. AIRY, *Apology for Rubble Walls;* and *Rubble or Rubbish?* ASSOCIATED SOCIETIES, *Reports and Papers*, 1851, i, 372-81. REDGRAVE, *Architectural Treatment of Rubbish*, BUILDING NEWS *Journal*, 1871, xx, 16, 27. 5. 25.

The term is also given to the *débris* of building materials, both old and new. All "old materials and rubbish" by custom become the property of the builder or other tradesman, unless declared otherwise in the specification or by agreement.

RUBBLE BÉTON. RENNIE, *On the Employment of Rubble Béton or Concrete in works of Engineering and Architecture*, at INSTITUTE OF CIVIL ENGINEERS, *Transactions*, 1857. ARTIZAN *Journal*, 1857, xv, 133; 153. CIVIL ENGINEER, etc., *Journal*, 1857, xx, 196; 230. BETON.

RUBBLE MASONRY, WALL, AND WORK (Lat. *diamicton;* Fr. *moellon; limousinage* and *limousinerie*, because formerly executed by French workmen who were exclusively Limousins (25). Coarse walling constructed of small roughly-shaped stones; also walling of squared stones on the outside backed by similar rough materials. The various sorts are named s. v. MASONRY. Rubble work in Germany during the mediæval period was always covered with plaster, inside and outside; BREWER, at Royal Inst. of Brit. Architects, *Sessional Papers*, 1867-8, p. 151. HEATH, *Decay of Materials in Tropical Climates*, CIVIL ENGINEER, etc., *Journal*, 1866, xxix, 323.

The weight of a cubic foot of rubble work is about 140 lbs., and of hewn stone 160 lbs. A cube yard requires $1\frac{1}{5}$ cube yard of stone, and $\frac{1}{4}$ cube yard of mortar. HURST, *Pocket Book*, p. 202. It is also measured by the PERCH, by the ROPE, and by the ROOD or ROD. 1.

It is noticed that the walls of Kilmainham prison near Dublin being of limestone, the cells are often damp in wet weather, particularly in the lower story; WHITELAW AND WALSH, *Dublin*, 4to., Dublin, 1818, ii, 1060. The *Report* of the Commissioners who visited the District Lunatic Asylums in Ireland in 1855, contains valuable information on the bad effects resulting from the use of uncoursed rubble masonry in those buildings.

INSTITUTION OF CIVIL ENGINEERS, ii, 177; x, 238; xvi, 423. BUILDER *Journal*, xi, 605. HASKOLL, *Railway Guide*, 8vo., 1842, p. 52. PASLEY, *Outline of a Course*, 4to., Chatham, 1826, p. 302; 8vo., 1862, p. 226. LIVERPOOL ARCH. SOCIETY, *Proceedings*, etc., 4to., Liv., 1852, i, 189. PARKER, *Walls of Rome*, 8vo., 1876. BLOCAGE. BOND. BOULDER WALL. FLINT WORK. GUNDULFUS. JOINTING STONEWORK. KENTISH RAG. MOILON. RAG WORK. RANDOM COURSE. SNECKED. SPAULED. In ancient work, see MASONRY.

RUBBLE ROAD. A road formed of rubble stones laid on a well-rolled prepared bed trimmed with a crown of 8 ins., not over 9 ins., in diam.; over them is spread a layer of chippings to fill the interstices and well rolled. Gravelly earth is then spread, watered and rolled down firmly to close all apertures. The top gravel is applied in two layers and then thoroughly rolled until compacted. The roads in the Park at New York are thus made. BUILDING NEWS *Journal*, 1872, xxii, 357.

RUBBLE STONE, also called "Reading abbey concrete", patented by — Wheeble, was formed of an admixture of hydraulic lime with gravel, shingle, stone, chalk, sand, clinkers, or fragments of old bricks. No skilled labour was required to make it. The manufacture was said to resist water, heat, cold, and pressure; to present a clean and smooth surface for mouldings, and such like; to acquire a great hardness, and capable of being used in a short time after leaving the mould. Steps, landings, blocks for walls; tubes; etc., were said to be made of this material. BUILDER *Journal*, 1862, xx, 489, 595.

RUBENS (SIR PETER PAUL) born 28 June 1577 at Siegen, Cologne, or Antwerp (BUILDER *Journal*, 1877, xxxv, 752), seigneur de Steen, the celebrated painter. To him is attributed the design of the whole edifice of the (former) Jesuit church of S. Carlo Borromeo with its library at ANTWERP, built 1614 or 1615-21 by a lay brother P. Huyssens, under their rector F. Aguillan of Bruxelles; a drawing by Rubens of the front existed 1763 in their library; the choir was rebuilt after a fire in 1718: plan and elevation in GOLDMANN, *Civilbau*, by Sturm, 1716-52, pl. 14; *Les plafonds*, etc., gravez par Punt, fol., Amst., 1751: 1610 he designed his own residence, now No. 1450 rue de Rubens at Antwerp (front rebuilt); the painting pavilion remains: 1617 high altar of N. D. de la Chapelle at Bruxelles: 1624 the porte de l'Escaut in honour of Philip IV of Spain; the sculpture by A. Quellin, sen.; No. 1241 rue de l'Empereur, the sculptures by A. Quellin: and eleven triumphal arches with other decorations for the entry 1634 or 35 of the archduke Ferdinand; six of the designs from the Walpole collection are now in the Hermitage palace at S. Petersburg. He published *Palazzi di Genova con le loro piante ed alzati*, 139 pl., 2 vols., fol. Antwerp, 1622; 1652; 1663; 1708. J. Franquart is supposed to have been a pupil. A colossal bronze statue of Rubens by W. Geefs was erected 1841 in the place Verte at Antwerp, where he died 30 May 1640. D. TURNER, *Cat. of the Works of Art in the possession of R. at the time of his decease*, etc., 8vo., 1839. VERACHTER, *Le Tombeau de R.*, 8vo., Antwerp, 1843. KETT, *Rubens, from Recent Authorities*, 8vo., 1881. WAAGEN, *P. P. R., his Life and Genius*, transl. by Noel, 8vo., 1840. 14.

RUBENS'S BROWN. The pigment used in the Netherlands is an earth of a lighter colour and more ochreous texture, of a warmer or more tawny hue, than the Vandyke brown of the London shops. It is a beautiful and durable brown, working well both in water and oil, and much resembles the brown used by Teniers. 9. 23.

RUBIGO, or Ferrugo. The colour which bronze acquires from age, as distinguished from AERUGO, the bright green verdigris.

RUBISLAW QUARRY. The first known of the quarries near ABERDEEN producing the grey granite used in that city. GRANITE (p. 73).

RUBRIC OR MADDER LAKES. These pigments are of various colours and known as rose, rubiate, rose madder, pink madder, and Field's, lakes. They afford the purest and truest carnations known, and their transparency renders them perfect glazing or finishing colours: and are not liable to change by the action of either light or impure air, or by mixture with other pigments. 9. 23.

RUBY WOOD; see PTEROCARPUS and PTEROMA. RED WOOD.

RUDD (JEAN (OR T.) BAPTISTE), born 13 Dec. 1792, at Bruges, son of an English cabinet maker who had settled there, gained prizes in 1810-8-9. He measured and drew the monuments of that city, and published in 15 parts, from his own engravings, *Collection de plans, etc., des principaux Monumens, etc., de Bruges, xiv to xvii siècle*, fol., Bruges, (1824). A copy is in the South Kensington museum. He was appointed architect to the city and designed several buildings, etc. DELEPIERRE, *Artistes Brugeois* 8vo., Bruges, 1840, p. 149.

RUDDLE. A red ochre used by masons in marking stone; see REDDLE or red bole. Carpenters now use white chalk, but formerly the 'rubrica fabrilis' or red chalk, for marking timber.

RUDENTURE. A French term often used by English writers; see CABLING. 1. 2. 4. 5. 23. 25.

RUDERA and RUDUS. A classical word signifying rubble, rough stone, or broken pottery; hence a pavement or passage generally composed of rubble; SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, p. 351. BIPEDA, or the roman brick, 2 ft. by 1 ft. by 4 ins. thick, was used as the foundation of the pavement called *ruderatio*, the modern 'terrazzo' or 'lastrico' or more commonly 'pavimento Veneziano'. VITRUVIUS, vii, 1; v, 10. *Detached Essays*, Baths, etc.: GRECANICUM OPUS. The Roman *via* consisted of stones and cement called *statumen;* of gravel or small stones, *rudera*, and finished by large masses of stone carefully fitted. Work with new rubble was called 'rudus novum', and 'rudus redivivum' when of old stones broken up; SCHAYES, *Arch. en Belgique*, 8vo., 1850-3, i, 53. 1. 25.

RUDE STONE MONUMENT. FERGUSSON, *R. S. M. in all countries*, 8vo., London, 1872; reviewed BUILDING NEWS *Journal*, 1872, xxii, 157-8. T. ROGER SMITH, *R. S. M.*, BUILDER *Journal*, 1878, xxxvi, 651. LUKIS, *R. S. M. called Cromlechs*, 8vo., 1875. WARING, *Stone Monuments*, 4to., 1870. DRUIDICAL. CYCLOPÆAN. Capt. Carden's discoveries in Moab; quarterly statement of the Palestine Exploration Fund, 1882.

RUE; OCRE DE; or Spruce ochre; see BROWN OCHRE. 9.

RUE (JEAN BAPTISTE DE LA), 1728 member of the academy of architecture; published a good *Traité de la coupe des pierres*, fol., Paris, 1728; and died in 1743, not 1750 as stated in NAGLER. 68.

RUEDA (JUAN DE), maestro mayor at the Alhambra at Granada, visited 1660-1 the sagrario in Seville cathedral. 66.

RUESGA (JUAN DE), of Segovia, assisted 1494 at the completion of the monastery of Sta. Maria del Parral at Segovia; and completed, after the death of M. de Solorzano in 1506, the cathedral of Palencia, by finishing the choir of the church del Parral. 1. 66.

RUETGER (.....), fifth baumeister 1330-32 at Cologne cathedral. ALLGEMEINE BAUZEITUNG, 1843, p. 42.

RUFFINI (FLAMINIO), of Reggio, *fondatore* of the college of Jesuits, where he designed the church of S. Giorgio; and died 14 Nov. 1658. 93.

RUFUS (CAIUS JULIUS); see JULIUS RUFUS (C.)

RUGGIERI (FERDINANDO), also an engraver, of Florence, 1705 carried out with Cecchini, the design of C. Fontana for the palazzo Gino-Capponi, via S. Sebastiano; 1715 designed the façade of the church of S. Firenze; published *Studio d'Architettura civile—di Firenze*, 3 vols., 237 pl., fol., 1722-28; (a second edition, *Scelta di Arch. Ant. e Mod.—di Firenze*, 4 vols., by G. Bouchard, 1755-62); 1724 drew and engraved the funeral procession and burial of king Luis I of Spain; the palazzo Pandolfini in 3 pl.; the Medicean library; the palazzo Nicolini di Pausacca; and *Descrizione dell' Arco. inalzato della nazione Britannica—di Livorno, per don Carlo duca di Parma*, fol., Flor., 1732; designed 1736 the church of Sta. Felicita; 1740 palazzo Poniatowski, formerly Capponi ora longa, interior since decorated; and 1740-1 the campanile of S. Lorenzo. The date of his death is unknown. FANTOZZI, *Nuova Guida*, 8vo., Flor., 1842 68.

RUGHESI (FAUSTO), of Monte Pulciano, designed the façade of M. Lunghi's church of Sta. Maria in Vallicella, still known as "la chiesa nuova" at Rome, consecrated 13 May 1599 (LUNGHI, p. 156); both were superintended by G. Guerra. RUBEIS, *Insig. Romæ Temp. Pros.*, fol., Rome, 1684, pl. 29-30.

RUIN. A term applied to buildings fallen into decay, such as the cities of Palmyra, Persepolis, Herculaneum, Pompeii, and others. Also of particular buildings, as in Athens, Rome, etc. Some picturesque ruins have been built purposely to represent an edifice in a decayed condition. The ruins at Virginia water near Windsor, form a good example. 6. 25.

RUIN MARBLE; see LANDSCAPE MARBLE.

RUINOUS BUILDINGS. *Means generally employed to remove;* CIVIL ENGINEER, ETC., *Journal*, 1839, ii, 135. The Metropolitan Building Act, 18 & 19 Vict., 1855, c. 122, § 69, and the Amendment Act, 1882, § 17, relate to dangerous structures.

RUIZ (MARTIN), 1585-8 maestro mayor at the cathedral of Salamanca. 66

RUIZ (AUGUSTIN), son-in-law and disciple of Bartolomé, was 1620 aparejador of the royal works at Aranjuez.

RUIZ (BARTOLOMÉ), 1584 aparejador of the royal works at Aranjuez, and from 13 April 1592 maestro mayor of the monastery at Uclés. He died 1593. His brother ANTON was 1584 aparejador at the Escurial; and 1587 assisted J. de Minjares at Espinar. 66.

RUIZ I (FERNAN OR HERNAN), was 1523 appointed maestro mayor of the cathedral at Cordoba, which he commenced; 1535 and 1545 was at Seville; 1543 was empowered as joint chief director to erect with B. de Morales the hospital de la Sangre; 1544 perhaps began the church at Pedroche; and died 1547. 66.

RUIZ II (FERNAN OR HERNAN), born at Cordoba, succeeded his father 1547 as maestro mayor of the cathedral at Cordoba, and 1571 completed the capilla mayor; 1558 continued the church at Pedroche; 1550-6 the bridge at Benameji; 1551 visited Seville, and 1554 Malaga; 1558 appointed maestro mayor to the hospital de la Sangre, continuing M. de Gainza's design; 1558 appointed maestro mayor to the cathedral at Seville, where he continued the design of M. de Gainza (died 1555) for the capilla real (completed 1575 by A. de Maëda I); and 1568 raised 100 ft. the great tower called 'la giralda' finished by the bronze statue of Faith, (he was succeeded there about 1574 by J. Dios de Palaciòs); 1570 went to Madrid; and died before 19 January 1583. 1. 3. 66.

RUIZ III (FERNAN OR HERNAN), maestro mayor to the cathedral at Cordoba, was before 1586 forced by the archbishop to resign; he was reinstated; 1593 raised the towers; and died 1604, being succeeded by J. de Ochea. 66.

RUIZ DE CHARTUDI (MARTIN), 1576 maestro mayor and aparejador at Segovia cathedral. 66.

RULE OR TWO FEET RULE. A measure used by artificers. FOOT. MEASURE OF LENGTH, etc. There are various sorts of rules. *Scamozzi's rule;* a two foot joint rule, invented by that famous architect for the use of builders. *The Carpenter's or Joint rule*, 24 ins. long and 1¼ ins. broad, each inch being subdivided into eight parts. Gunter's line of numbers is generally on the same side; on the other are the lines of timber and broad measure, the first beginning at 8½ and continued to 36 near the other end; the latter numbered from 7 to 36, four inches from the other end. NICHOLSON, *Dictionary. The Mason's rule*, 12 or 15 ft. long, is applied under the level for regulating the courses and making the "piedroits" equal. *The stone cutter's rule*, usually 4 ft. long and divided into feet and inches. 1. 2. 4.

PLUMB RULE. JOINTING RULE of bricklayers. SLIDE or Sliding RULE.

1540 *circ.*; 1562, Sir R. de Benese, *Maner of Measuryng, etc.*, noticing twenty-four inches.

1556, Digges, *Tectonicon*, published 1637; "carpenter's rule 12 ins., truly it were more commodious if it had two fote in length."

1582, Worsop, *Discoverie of sundrie errours, etc.*, 4to.; Notes and Queries *Journal*, ser. 2, xii, 427.

1612, Bedwell, *Trigonicum architectonicum; the Carpenter's rule explained, reformed, and enlarged*, fol.

1631; 1639, *Mesolabium Architectonicum; a most rare and singular instrument, etc., measuring planes and solids by the foote.* It is flat, 2 ft. or 18 ins. long, and 2½ ins. broad; (Cooper, *Athenæ Cantab.*, ii, 539.)

1651, Stirrup, *Artificer's plain scale, or the Carpenter's new rule*, 12mo., Lond.

1668, Leybourn, *A Mate for Measurers*, in *A Platform for Purchasers, etc.*, 8vo., noting the rule "divided into inches and parts."

1688, Holme, *Academy of Armory*, fol., Chester, mentions a ten feet rod and a two feet rule.

1729, Coggleshall, *Art of practical measuring easily performed by a two-foot rule*....."Scamozzi's" lines, etc., 12mo.

1786-8, Chambers, *Cyclopædia*, notices the mason's rule as 12 or 15 ins. long, and the stonecutter's as 4 ft. long, and the carpenter's as 24 ins.

Steel rules and measuring tapes; the inches and divisions printed on the polished surface are placed in an acid which corrodes the parts marked. A simple new pocket rule has been patented by L. Appleton, graduated in such a manner that the exact centre of anything measurable within the length of the rule can at once be ascertained. On the same principle a rule of any size can be made. A rule with patent bolted joint for setting to any angle, or to make a firm straight edge, is made by Bradburn of Birmingham.

RULE JOINT; also called "Radius joint", and formerly "knuckle joint". It is formed by a quarter round worked on the edge of a leaf of a table, or edge of a door (JIB DOOR), so that when opened the usual crack at the hinge does not show.

RULER; see Parallel ruler. A flexible ruler adapting itself to the contour of the surface to be ruled, is described Building News *Journal*, 1866, xiii, 560. Marquoi's rulers; one rule sliding along the edge of another. 14.

RULER of a building. This term is used in respect of Rob. Watson, who kept the book of accounts of the building of Hengrave hall, *temp.* Henry VIII. Gage, *Hengrave, etc.*

RUMALDE, Runaldus; see Romualde.

RUMFORD (Benjamin, Count of); see Thompson (B.).

RUMMAGING. A term in the timber trade for "getting the floating balks out of the water".

RUN CHANNEL. The north country term for the gutter or sunk channel in a pavement taking the water from a down-pipe to the kennel. Settle is when such a gutter is formed by two inclined planes only. Loudon, *Encyc., of Cottage, etc., Arch.*, 8vo., London, 1833, § 1206. Cattle shed.

RUNCIMAN (.....), an architect of Edinburgh, whose son Alexander born 1736 became an eminent painter. 14.

RUNCORN QUARRY. This quarry is situated near Weston, Cheshire; it furnishes a light dun-coloured (called red stone) fine-grained sandstone, and a yellowish cream-coloured sandstone (called white stone). When exposed to the action of the air, this stone rapidly decays, as at the docks at Liverpool, and the pier at Douglas, Isle of Man; but in submarine works it is particularly useful. The soft texture of the stone renders it easy to hew large blocks from the quarry, to adapt them to any form, and when submersed they become very hard. Each block taken to Howth harbour 1807-17 weighed 4 tons. It was also used at the corn exchange and other buildings at Liverpool; the exchange at Manchester 1806-8 by T. Harrison; and by him 1827-32 for the dry arches at Chester bridge; the columns of the portico at Tabley house, Knutsford, Cheshire, by J. Carr, 1762-9, are in a single block. The lateral strength of the stone is given in Architect *Journal*, 1850, ii, 329. Telford, *Report on R. Bridge*, 4to., War., 1817.

RUNG. The round or spoke of a ladder, and also the cross bar to the legs of a chair; still used in Scotland and America; and in west riding of Yorkshire 1811; Archæologia, xvii, 156.

RUNIC KNOT. A twisted ornament, often formed by a serpent or dragon wind, carved on rocks and in sculpture of Scandinavian origin, dating subsequent to the Christian era; it also appears in gold and silversmith's work, illuminated MSS., etc. Publications named s. v. Ornament. The door jambs at the churches of Borgund, Hitterdal, and Tind, are given in Weale, *Quarterly Papers on Arch.*; French, *Attempt to Explain the Origin and Meaning of the Early Interlaced Ornamentation found on the Ancient Sculptured Stones of Scotland, Ireland, and the Isle of Man*, 8 pl., 8vo., Manch., 1858.

RUNIC WRITING. It is stated to be mentioned about 580-90 by Venantius Fortunatus; to have been condemned 1115 by council of Toledo; and 1136 prohibited by Alfonso of Castile. The learned work of Stephens, *Old Northern Runic Monts.*, fol., Cop., 1866-8, states that "England yet can boast a greater number of 'Old Northern' pieces than any other country; that the language is Old Northern and not German or Saxon; that the 36 runic pieces in England date from about v to about xii cent."; and p. 13, gives a list of Runic literature, comprising (in English) Duncan, *Ruthwell Cross*, 1832; Kemble, *The Runes of the Anglo-Saxons*, 1840; Haigh, *Saxon Cross at Bewcastle, etc.*, 1856, and other works; Cumming, *Runic Monts., etc., of the Isle of Man*, 1857; Maughan, *Bewcastle, and Carlisle Cathedral*, 1857; Farrer, *R. Ins. in the Orkneys*, 1862. 14.

RUNNER. A term in use in Lancashire for a "single joist".

RUNNING MEASURE. A piece of work measured by the foot run, at a width, in contradistinction to the foot superficial, or yard square.

RUNTREE. The Scotch term for quartering.

RUN WITH LEAD; to. (Fr. *couler*). The north country term is "to bat"; Loudon, *idem*, 1068; 933.

RUPEL (Richard), 1426, see Powle (A.).

RUPERTSLAND. A bishopric in the province of Manitoba, part of the north-west territories, comprised since 1870 in the dominion of Canada. The see was formed about 1860; the residence is at Bishop's Court; S. John's cathedral and college are situated about two miles from the centre of Winnipeg (incorporated 1873), the capital of the province; to which city Manitoba college begun 1871, was moved 1874, and in 1882 a portion was erected costing £8000, out of an estimated total of £25,000. Bryce, *Manitoba, etc.*, 1882. 28.

RUPP (Ladislaus), born 179 , at Vienna, was resident at Milan about 1836. He published *Pianta, etc., della Chiesa di S. Stefano di Vienna*, fol., n.p., n.d.; *Descr. Stor. Crit. di duomo di Milano*, 65 pl., 4to., Milan, 1823; and made the drawings and engravings for *Eglises principales de l'Europe*, containing S. Peter's at Rome, S. John Lateran, S. Marco, the Superga at Turin, cathedrals of Milan, Vienna, Florence, Pisa, Siena, Antwerp, and Ghent, 2 vols., fol., Milan, 1824-31. 68.

RUPP (.....), stadtbaumeister, 1841, restored the fine church of Nôtre Dame at Reutlingen; and many other monuments of the middle ages. Heideloff, *Ornamentik*, 4to., Nürn., 1847, livr., xvi, pl. 1. 68.

RUPPRECHT (Georg and Fritz), of Nuernberg, with the sculptor Sebald Schonhofer, built 1354-61 the Frauenkirche in that city; and 1355-62 the fountain 60 ft. high in the Hauptmarkt, similar in design to the Eleanor crosses; the railing at the base 1586-7 is by Paul Kohn; the fountain was restored 1821-4 under the direction of A. Reindel, director of the school of arts. 1. 68. 92.

RUPTURE. From various experiments on different materials, the laws which regulate the resistance of materials to flexure and rupture, caused by a cross strain, can be ascertained; but the values require modification in practice, as the materials must not only be strong enough to resist any effort whose action for a short time would cause rupture, but they must also be secure from the effects of permanent or frequent repetition of such action, and the alterations to which they may be subjected from accidents and the effects of time. Strains

vary as the moments of rupture. The *Joint of rupture in an arch* is said to vary with the form, in a semicular one at from 30° to 35°. Dilatation. Elasticity. Extension. Fracture. Resistance. Strain.

RURAL ARCHITECTURE. It includes Cottage; Cottage ornée; Farm buildings; Kennel; Labouring poor; Lodge; Rectory; Villa; etc.; publications are named under each. The following list comprises the later publications on rural architecture.

Descriptions of the Modern Style of Rural Arch., etc., 4to., 1807. Gandy, *R. Architect; Designs for Country Buildings*, 4to., 1805, Loudon, *Country Residences*, 4to., 1806, ii, 680. Papworth, *R. Residences, etc.*, 4to., 1818; 1832. Morel-Vindé, *Constructions Rurales, etc.*, fol., Paris, 1824. Carlisle, *Hints on Rural Residences*, 4to., 1825. Thomson, *Retreats, etc.*, 4to., 1827. Kurt, *Temples, R. and Rustic Decorations*, 4to., 1829. Parker, *Villa Rustica*, 4to., 1832. Duval, *Arch. Civile et Rurale*, 4to., 1832. Loudon, *Ency. of Cottage, Farm, etc., Arch.*, 8vo., 1839. Taylor, *Agric. Buildings for Irish Estates*, 4to., 1841. White, *R. Arch., or Designs*, fol., 1845. Roux, *Recueil de Const. Rurales, etc.*, 4to., 1847. *Models of Rural Abodes for Farm Labourers*, fol., 1847. Ricauti, *Rustic Arch.*, 4to., 1848. Petit, *Habitations Champêtres*, 4to. (*cir.* 1850). Downing, *Arch. of Country Houses*, 8vo., 1852. Allen, *Rural Arch.*, 12mo., 1852. Upjohn, *Rural Arch., designs*, 4to., 1852. Gray, *Treatise on R. A.*, Edinb., 1852. Weaver, *Hints on Village Arch.*, fol., 1852. Sanderson, *Rural Arch., series of designs*, 8vo., 1853. Starforth, *Designs for R. Residences*, 4to., 1865. Young, *Pict. Examples of Old Churches and Cottages from Sussex*, 4to., 1869. Young, *Pict. Arch. Studies, etc., for Gate Lodges, etc.*, 1872. Jacques, *The House; a Manual of R. Arch.*, 12mo. Bosc, *Arch. Rurale*, 4 vols., 8vo., Paris, 1875. Wilkinson, *English Country Houses*, 8vo., 1878? and publications by Goodwin, Hunt, Robinson, Gilpin. 1. 2.

RUSCA (Ludwig), also written Rousco and Rusco; of Agno in canton Ticino, was born 1758. At S. Petersburg he 1800 completed the imperial public library, begun 1795 by Socolav; a mosque for the Tatars; repaired 1801 the Taurida palace (Athenæum *Journal*, p. 87); rebuilt the palace at Strelna, and furnished it in six months after the fire 28 Dec. 1803; designed 1804 the picture gallery, etc., adjoining the Winter palace, with a theatre; and 1818 the church of the Skorbyashtnek or S. Vièrge des souffrans. At Moscow, he designed the barrack for the regiment of Astrachan with its hospital; at Tcherkash a gymnasium; at Czerkash, the capital of the Cossacks of the Don, the cathedral and other public buildings; at Tiflis in Georgia, a mosque; and published *Recueil des Dessins de différens Bâtimens, etc.*, fol., S. Pet., 1810, which, besides the above works, gives designs for the barrack, etc., for the regiment des chevaliers gardes; another near the stream Carpofka; and others; corps d'écuries of the court, all at S. Petersburg; with many houses for noblemen and others in that city and elsewhere. He died suddenly 1822 at Valenza, near Alessandria. Svinin, *Descr. de S. Peters.*, 4to., S. Pet., 1816-28, iii, 69; iv, 185. 68.

RUSCELLI (Girolamo), of Perugia, born 1538, also a clever mathematician; died 1604. 42.

RUSCONI (cav. Camillo), of Milan, a pupil of Ercole Ferrata, was also a good sculptor. He worked at Bologna, and died in 1731. 105.

RUSCONI (Giovanni Antonio), of Venice, a pupil of N. Tartaglia of Brescia; designed the casino on the banks of Malamocco for N. H. Francesco Pisani (Temanza, *Vite di Palladio*, p. 363); 1562 advised with G. Alessi and A. Palladio upon the decorations to the great hall of palazzo pubblico at Brescia; and upon the restoration of the ducal palace at Venice after the fire of 1577; and designed the altar of the wine merchants in the church of S. Silvestro; Cicognara, *Scultura*. He wrote *Della Architettura, con cento-sessanta figure—di Vitruvio, etc.*, fol., Venice, 1590; soon after which he appears to have died. A second edition appeared *Accresciuti della prattica degl' horologi Solari*, fol., Venice, 1660. Cadorin, *Pareri*, 8vo., Ven., 1838, p. 14-32, gives a memoir. Zamboni, *Brescia*, 4to., Bres., 1778, p. 69, etc.; 137-9. Serlio, *Architettura*, 1663, pref. 68.

RUSELLÆ; see Roselle in Etruria.

RUSH. *Juncus effusus*, soft rush, and J. conglomeratus, common rush, are used with the flags for the bottom of chairs, etc.: the pith of some species when peeled and dipped in tallow, for candles, in "rush lights"; and for making mats for carpets or beds, window curtains, etc., in Japan. In England, the rush was used for covering floors of rooms in public buildings and houses of the wealthy even as late as xvi cent.; as 1527 at Hengrave Hall. Issue roll 43 Henry III, notes 200 rushes for strengthening the brick wall before the outer chamber, bought at Wytheflet with carriage by water to Westminster, 2s.; Devon, *Exchequer issues*, 4to., Lond., 1837, p. 66. Advantage of rushes growing on banks of canals; Gardeners' Chronicle, and Building News *Journal*, 1876, xxxi, 92. Reed. Rode. Equisetum, scouring or Dutch rush. 14. 19.

RUSICADA, now Sgigata (Shaw) or Stora, in Algiers. The Roman remains are said (1838) to be well preserved; in particular an amphitheatre, mentioned by Texier, *Asie Mineure*, fol., Paris, 1849, ii, 174-227; two temples, and a magnificent cistern or fountain, now corn store. Shaw, *Travels in Barbary*, etc., 4to., London, 1757. Delamère, *Archéologie*, Algiers, Explor. Scientifique 1840-2, fol., Paris, 1844, etc., pl. 37-46, Phillipeville à Stora.

RUSS PAVEMENT. A pavement so called in New York, possibly from the Fr. *ruisseau*, applied to a pavement with a fall each way into the middle. 5. 25.

RUSSELL (H.), 1825 obtained the gold medal for architecture at the royal academy of arts in London. Perhaps the same as

RUSSELL (H. H.), a pupil of E. Lapidge; patented 1845 a railway suspension bridge; detailed in Civil Engineer, etc., *Journal*, 1846, ix, 10.

RUSSELL (S.), "son of the well known academician"; whilst an officer of the Madras engineers, designed 1803 the British residency at Hyderabad, (not completed in 1813). It is a fine structure of the Corinthian order as shown in Grindlay, *Scenery*, etc., fol., London, 1826, ii, pt. iv.

RUSSELL (W.) 1836 competed for the Houses of Parliament.

RUSSET. A tertiary colour formed by mixing orange (yellow and red) with purple (red and blue) red predominating. A dark brown colour. 9.

RUSSIAN ARCHITECTURE. For details of the history of the arts, consult *Précis historique des Arts en Russie*, in Le Courier de S. Petersburg, Feb. 1812, No. 2, and given in Svinin, *Descr. de S. Peters.*, 4to., S. Pet., 1816-28, ii, 67-95: Lyall, *Character, etc.; Essay on Origin and Progress of Architecture in Russia*, 4to., London, 1823: *Traces of Modern Architecture and Art in Russia*, in Civil Engineer, etc., *Journal*, 1854, xvii, 336: Fergusson, *History, etc.*, 1867, ii, 350-63, and *Modern Styles*, 1862, p. 380-407: and *Ecclesiastical Architecture of Russia* in three eras, 989-1475 Byzantine; 1475-1689 National; and 1689-1858 Renaissance; in Builder *Journal*, 1877, xxxv, 1215, 1291, and xxxvi, 55. Kiprianov, *Hist. de l'Arch.*, 1864. 1. 14. 28.

As the history of Russian architecture is stated as yet to be written, the following notes may be useful. The Swedish Norsemen, early in ix cent. invaded the eastern coasts of the Baltic—Courland, Esthonia, and Finnland—perhaps penetrated as far as Novgorod, were repulsed, but 862 invited to return, and Rurik of Sweden founded there a kingdom; others settled at Kiev. In x cent. they menaced Constantinople, penetrated to the Caspian sea and to the borders of Tartary and Persia. Vladimir (981-1015) having conquered the Chersonese peninsula became possessed of works of art, amongst them the brazen gates of Corinth and four bronze horses afterwards placed in front of the palace of his son and successor Jaroslav, who founded Dorpat. Vladimir built Vladimir and other towns; sent noblemen to Greece and Italy, from whence he invited artists and workmen. Kiev, where Christianity was first introduced 992 by Vladimir, was for a long time the capital of all

Russia; it had a great brick wall, gilded gates, and hot baths; in the time of Dittmar von Merseburg (died 1018) it contained 400 churches and 8 great markets: in 1080 it was called a second Constantinople; the cathedral of S. Sophia, founded 1037, was executed by Greeks, with other churches. The town was completely sacked 1169, and the government removed to VLADIMIR, where the cathedral had been erected 1046 by Greek artists; the town was nearly destroyed 1201. At NOVGOROD, the kremlin was commenced 1037; the cathedral of S. Sophia, founded 1045, was built with five domes, by Greeks after the model of that at Constantinople; it is said to be a perfect specimen of the Byzantine style; its bronze doors with reliefs date 1160. The townspeople are stated to have built Yam in 1332 of stone in thirty-five days; and at Vologda a church of timber was built in one day.

A second period of art began with the reign of Ivan III (1462-1505), who, marrying at Rome 1 June 1472 the princess Sophia, daughter or niece of Constantine Palæologus, was followed to Russia by artists expelled from Greece. Being desirous of embellishing Moscow, which from 1490 became the capital of the empire, he sent to the Venetians for architects; the kremlin walls were rebuilt 1485-95 by Germans or Italians; the cathedral of the Assumption 1475-91 was designed after that at Vladimir, but in the Italian style; cannon were founded and coins issued; a Greek artist designed two other churches; the *stone* Granatovitaja palace 1487-91 was built; and a number of good native workmen came forward. The kremlin at Smolensk was then built. After defeating Ahmed, khan of the Golden horde about 1476 and 1481, the Poles 1482, the khan of Kasan 1487, Ivan III 1480 carried to Moscow from Novgorod three hundred chariots laden with gold and silver articles; and obtained miners from Mathias Corvinus of Hungary, as well as from the emperor Maximilian I of Germany. Near Novgorod Ivan IV (1533-84) built 1543 a timber church, still existing; and at KAZAN, among other edifices, the church of the Holy Virgin, founded 1579, the prototype of all other Greek churches in Russia. At Moscow (nearly all burnt 1547, and destroyed by the Tatars 1571), the church of S. Basil, one of twenty-one small churches in the Pokrovskoi Sobore, was erected 1554-5 by a foreigner (Ivan obtained 120 artists from Charles V) and native artificers, the tradition being that the eyes of the architect were put out that the edifice might remain the only structure of the sort. He erected the larger half of the immense monastery of S. Sergius at Troitza, forty miles from the city, containing ten churches, etc. (the palace within the walls was built by Peter I): this monastery has a permanent school of art workmen especially for producing pictures of the saints, etc. Archangel was founded; and the first printing-office established. Boris Godounov (1598-1604) built the large tower on the walls at Moscow.

The third epoch commences with Peter I, the great (1682-1725), who by means of his genius gave a new face to his empire, sent young persons to Italy and Holland to study art, laid the foundation of the academy of arts; learnt shipbuilding and founding cannon 1698 at Deptford; sent over geometricians from London, who founded the marine academy; numerous engineering works were commenced; three hundred artificers were sent from Holland to Archangel, and thence to different places; those whom he engaged at Amsterdam took the route to Narva. General Sheremetef, at the head of an embassy to Italy, engaged artists and visited Rome, Naples, Venice, and Malta, while the Czar went to Vienna. S. Petersburg, the new capital was founded 1703. In the army of Charles XII, defeated 1710 at Poltava, were experienced Swedish, German, and French officers, artists, and others, who founded schools in Russia for their livelihood, and many never returned home. Odessa was founded 1794 for the empress Catherine.

During and since the reign of Peter I (1682-1725) architecture at the Russian capitals has been indebted to many celebrated foreigners, all practising Italian architecture, the chief of whom commence from about 1700, as Tressini, Rastrelli, Rinaldi, Rossi, Cameron, Dumot, Quarenghi, Rusca, Brenna, Mauduit, Ricard de Montferrand, von Klenze, and Thon. Von Klenze attempted at S. Petersburg to introduce Greek art into Russia; the natives have endeavoured to reproduce their mediæval style for ecclesiastical purposes, one at Kief, several at Moscow and Novgorod, and one at Neu Georgiesk; (FERGUSSON). Among the native artists, chiefly pupils of the Russian academy, are found Jeropkin, Bazhenov, Starov, Volkov, Socolov, Boress, Zackarov, Voronikhin, Stassov, Bruilov, and others. The sculptors Kazlovski, Martoss, Mikeschine, and Martelli, deserve notice. The natives possess, generally speaking, a great aptitude for art; the superb columns of the cathedral of Kazan at S. Petersburg and other equally beautiful granite ornaments, are the work of native stonecutters who had no acquaintance either of the rules of sculpture, drawing, or perspective, and whose only instrument is a hammer and a small *baton* or file which takes the place of a measure; some of these productions pass through the hands of several workmen. The beautiful bone work of Archangel, and the silver work from Vologda and Oustague, also exhibit the talents of the Russians, in which country may be seen a carpenter with his great axe doing the finest work; (SVININ, ii, 95). The bulbous dome exhibits the influence of the Tatar; the buildings at Kiev that of the Greeks; at Moscow, of Italians and Germans; and at S. Petersburg, chiefly of Italian and French—Cameron was perhaps the only English architect of note. The style in all the churches is nearly the same and consists of a mixture of the Asiatic and Byzantine type, the cathedral at Vladimir erected 1046 by Greek artists was at first followed, and subsequently the church of the Holy Virgin at Novgorod, founded 1579.

The body of the Russian church is comparatively small, generally square, and painted white or yellow. Over the centre rises a turret or bulbous shaped dome surmounted by a golden ball and Russian Greek cross; at the four angles are smaller domes. The roof is covered with iron generally painted green. The upper part of the walls on the outside have either stucco ornaments and details for the most part of a debased character, or have scriptural and legendary paintings. The interior is usually plain but filled with images. A place at the further end is separated from the body of the church by a screen or ICONOSTASIS, either highly carved and gilt, or richly ornamented with images or with paintings of saints and others, and oftentimes with precious stones.

Architectural publications; LE CLERC, *Hist. de la R., Anc. et Mod.*, 6 vols., 4to., Paris, 1738-92. DAMAINE-DÉMARTRAIT, *Coll. complète de divers jardins et points de Vues des Maisons de Plaisance imp. de R.*, fol., 1811. Prince HOARE, *The Cultivation of P., S., and A., in the Austrian and Russian Dominions*, (Royal Academy), 4to., 1801-2. *Manual of Architecture* (in Russian), 4to., 1818. HEATH, *Pict. Annual*, by L. Ritchie, 8vo., 1836. GILBERT and VICKERS, *Russia Illustrated*, 1839. HALLMANN, *Hist. of Greco-Russ. Eccles. Arch.*, 4to., 1840. DEMIDOFF and A. DURAND, *Excursions Pitt. et Archæol., par Moscou, Novgorod, Kasan*, etc., en 1839, fol., 1840-47. SNEGIREV, *Monuments of Russia*, 1842-5. BLASIUS, *Reise im Russland*, 2 vols., 8vo., Brauns, 1844. STROGANOV and others, *Eccles., etc., Antiq. of Russian Empire*, 515 col. pl., 6 vols., fol., 1849-53-55. TH. RICHTER, *Mons. de l'Ancienne Arch. Russe*, fol., Mos., 1850-51. FURMANN, *Encyc. of Russian Arch.*, 4to., 1861. ARTAMOV ET ARMENGAUD, *Russie historique, mont. et pitt.*, fol., 1862-4. SMYTH, *Three Cities in Russia*, 8vo., 1862. V. KIPRIANOV, *Hist. Pitt. de l'Arch. en Russe*, 8vo., Mos., 1864. BOUTOWSKI, *Hist. de l'Ornement Russe x-xvi siècle*, fol., 1870-2. The Art publication "Zodtschy", 4to., 1872-80; is valuable as containing the *modern* works with the names of the architects, chiefly at S. Petersburg and Moscow; also several examples of old work and buildings.

Houses; BREMNER, *Russia*, 1839, i, 228; VENABLES, *Domestic Scenes*, 1839, p. 30, 96, 97-132; ILLUSTRATED LONDON NEWS, 1850, xvii, 153. LYALL, *Origin, etc.*, 1823, quoted in B. J., 1851,

ix, 438. *Homes of Russian workpeople*, B. J., 1874, xxxii, 324; 435; 1875, xxxiii, 671. *Ancient and modern residences of the Czars*, B. J., 1875, xxxiii, p. 271. WALLACE, *Russia*, 3rd edit., 1877, i, 349.

Russian Building Art at the Exhibition at S. Petersburg, B. J., 1871, xxix, 497; *and Building Arts of R.*, 517; *R. Building Trades*, 1876, xxxiv, 921. Third Russian Architectural Congress, 1874, BUILDING NEWS *Journal*, xxvii, 123.

Besides the publications mentioned specially under each city, the following are for general reference. OLEARIUS, *Voyages, etc., Muscovy, Tartary, etc.*, fol., 1669. PLESCHEFF, *Survey of the R. empire, with add. by Smirnove*, 8vo., 1792. Lord WHITWORTH, *Russia as it was in* 1710, 8vo., 1758. WRAXALL, *Tour through Northern parts of Europe*, etc., 8vo., 1775. MULLER, *Descr. de toutes les nations de l'empire R., etc.*, 4to., 1776. STRAHLENBURG, *Descr. of R.*, 4to., 1736. COOK, *Travels*, 8vo., 1770. BRUYN, *Voy. en Levant, etc.*, 4to., 1725; fol. 1737. CLARKE, *Travels, etc.*, 4to., 1810; 1823. DE WAXEL, *Recueil de quelques antiq. trouvées sur les bords de la mer noire*, 4to., 1803. CARR, *Travels, etc.*, 4to., 1805. ALLANSON, *Pict. Rep. of Manners, etc.*, fol., 1813. REICHARD, *Itin. of Denmark, etc.*, 18mo., 1820. CASTELNAU, *Hist. Anc. et Mod. de la Nouv. Russie*, 8vo., 1820. LYALL, *Travels*, 8vo., 1825. JOHNSTON, *Travels*, maps of cities, etc., 4to., 1815. ATKINSON, *Manners*, 1812. ANDERSON, *History of Russia*, 1815. BARROW, *Excursions in the S. of Europe, etc.*, 12mo., 1834. MORTON, *Travels*, 8vo., 1830. HOMMAIRE DE HELL, *La Mer Casp., Caucasse, etc.*, fol., 1844-5. WILSON, *Travels*, 8vo., 1828. DEMIDOFF, *Voy. dans la R. Merid., et la Crimée par Hongrie, etc., en* 1837, 3 vols., album, 100 pl. ALEXANDER, *Travels through R.*, 4to., 1830. DEMIDOFF, *Travels in S. Russia, etc.*, 8vo., 1853. MEYER, *Russische Denkmaler*. MIGNAN, *Journey*, 12mo., 1839. TIMKOWSKI, *Travels through Mongolia to China*, 8vo., 1827. RAGUSA (duc de), *Voy. en Hungrie, etc.*, 4to., 1837. MEYERBERG, *Sammlung von Ansichten, etc., auf seiner Reise in Russland*, 1661-2., fol., S. P., 1827. GILLES, *Antiq. du Bosphore Cimmérien*, fol., 1854. KELLY, *Hist. of Russia*, from Karamsin and others, 2 vols., 8vo., London, 1854 (Bohn). TOLSTOY, *The first* 40 *years of intercourse between England and Russia*, 1553-93, 8vo., S. P., 1875. D. M. WALLACE, *Russia*, 1877, 3rd edit.

TSCHERTKOW, publ. *Cat. of Russian Works referring to the History of R. empire;* and STRAHL, *Russian Religious Historians*, cont. by Snegirev of Moscow. ROMANOFF, *Rites and Customs of the Greco-Russian Church*, 8vo., 1868. KING, *Rites and Ceremonies of the Greek-Church*, 8vo., 1772. *Catalogue des Russica* (Foreign books on Russia), 8vo., S. P., 1873. USEVOLOJSKY, *Dict. Geog. hist. de l'Empire de R.*, 8vo., Mos., 1823. PAULY, *Descr. Ethno. des Peuples de R.*, fol., S. P., 1862. PEDISCHEFF, *Atlas Geog. de l'empire R., etc.*, fol., 1820.

RUSSIAN STOVE for warming, called *peech*, is formed of brick or tile work standing in the apartment, with an enclosed wood fire. In 1864 it was introduced in England with an open fire; and has been claimed as a "German stove". Its principle has lately 1881 been again put forward as Doulton's Terra Cotta stove. BUILDER *Journal*, 1871, xxix, 518. A description of it and the bad effects arising from neglect is given in VENABLES, *Domestic Scenes*, 8vo., London, 1839, p. 195.

RUSSIAN TIMBER; see DEAL; BALTIC TIMBER. CIVIL ENGINEER, *etc., Journal*, 1843, vi, 406.

RUSSY. An Indian land measure; see CAUR.

RUST. A red oxide or per- or sesqui-oxide of iron. ANTI-CORROSION OF IRON. CORROSION. HYDROGEN; OXIDATION.

RUSTIC or RUSTICK. A manner of building rather in imitation of nature than according to rules of art; the columns are encompassed with frequent cinctures, and the spaces adorned with bossage, hence the term RUSTIC ORDER. "Coluña striata pulueres colliget in strigilis. A 'playted pillar' gatereth dust in the swagementis"; HORMANUS, *Vulgaria*, 4to., London, 1519, fol. 241. "Striped pilasters" were used by I. Jones in the Covent Garden piazza, and at the loggia at Wilton; and by sir C. Wren in the portico to the theatre at Oxford. The "Grotesque Tuscan order" at the York stairs water gate, and the "Tuscan order" by sir C. Wren at S. Antholin's church, Watling Street, are given in LANGLEY, *Masonry*, fol., London, 1736, pl. xxviii and xxix: p. 219 and 220, which also criticises the rustics at the former gate to Burlington house, Piccadilly; and at the Mews, Charing Cross. SERLIO, *Architettura; Extra. libro (v) de Arch. Porte rustica*, 4to., Ven., 1567. PERUCCI, *Porte d'Arch. Rustica*, 18 pl. fol., Reggio, 1634.

RUSTICATED BOARDING. A species of weather boarding; but instead of the boards overlapping, each horizontal board is grooved on the bottom edge, otherwise the groove would hold wet and decay. Along the top of the under board is formed the rustic, the back of it being prolonged to form the tongue as usual in match boarding. It is an imitation of regular courses of stone, and is seen at railway stations; and is very common in America.

RUSTIC HUT. A garden building (sometimes called POLISH HUT, which differs from the ENGLISH hut and others, as it is formed of unbarked limbs of trees, and open in front, supporting a thatched roof). The sides and back on the inside are often ornamented with short lengths of small branches arranged into diamonds and other forms. KRAFFT, *Beaux Jardins*, fol., Paris, 1809, i, pl. 14, 81, 83; ii, 39. PAPWORTH, *Ornamental Gardening*, 8vo., 1822. HOFLAND, *White Knights*, fol. (1819).

RUSTICI (OTTAVIANO), a Dominican, *cir.* 1330-4 "eminently skilled in architecture" presided over the building of the church and monastery of Sta. Maria Novella, at Florence, the chapel of S. Niccolo, and the sacristy. MARCHESE, *Lives*, 8vo., Dublin, 1852, i, 105.

RUSTICO (GIOVANNI FRANCESCO), born 1500 at Florence, also a painter, etc., was a pupil of A. Verrocchio. M. A. Buonarroti with B. d'Agnolo were chosen as arbitrators of the value of Rustico's works at Florence. He went 1582 to France, where he was employed by François I; and received a pension, which was annulled by Henry II; he "died in the house of Pietro Strozzi in France", aged 80. GINORI, vi, says in 1540. 5. 30.

RUSTIC QUOIN. Stones, or imitation stones, at the angles of a building, projecting before the face of the wall, and ornamented with bossage or rustic work. Each alternate course consists of a long, or of a short, stone divided one from the other by a groove of some sort, which is often bevelled. QUOIN WORK.

RUSTIC WORK; RUSTIC MASONRY; RUSTICKED; and RUSTICATION. (Fr. *gresserie* ou *graisserie* (25); *bossage; champêtre*, BLONDEL, *Cours*, 8vo., i, 417.) The terms in general use for that species of masonry, in which the several stones in each course are distinctly marked by a square sunk joint or GROOVE (ANGLET), or chamfered or otherwise cut. It admits of great variety of treatment, consequently of expression also, from the actual roughness of stone as from the quarry (as ragwork), to the very reverse in studied ornamentation. If the edges be sunk or the centres raised it is called "rusticated work": square channels or rebates sunk round each stone are called "Italian rustics"; if the middle of the stone be worked to resemble a natural cleavage it is called "rough rustic"; if as gnawn by the action of worms, "vermiculated"; if full of shells, "marine"; if like deposit of fresh water in a cavern, "stalactite"; when in very rough blocks, "bossage"; if cut to point, "facetted", and so on. The proportions are fairly described s. v. Basement, in STUART, *Dict. of Arch.*, 8vo. (1830). Brick rustics are shown in LANGLEY, *London Prices*, 8vo., 1750, p. 292, pl. 28. CHAMBERS, *Decorative Part of Civil Arch.*, fol., 1759, shows many good examples of rustics. Antoine's works at Paris were marked by that form of rustication in which the perpendicular channels were omitted; it was used by I. Jones at old Somerset house; the India house by H. Holland; to some extent by sir J. Soane; and by others.

Under the French *bossage* the term is explained and illustrated in VIRLOYS, *Dict.*, 4to., 1771, iii, pl. 26; and *bossages ou pierres de refend* in D'AVILER, *Cours d'Arch.*, 4to., Amst., 1699, and other editions, ii, 29, pl. 43-5; and 97, and references given to the buildings where used, chiefly in Paris. VIOLLET LE DUC,

Dict., s. v., p. 217, gives a few woodcuts, chiefly Italian. *Rocaille* in QUATREMÈRE DE QUINCY, *Dict.* 25.

Ancient classic examples may be cited; the basement of the lantern of Demosthenes; in the enclosure at Assos; diamond cut, on the Odeon at Athens: at the Pnyx, STUART, *Athens*, by Kinnard, 1827, iii, 109; angular buttress to the peribolus to the temple to Jupiter Olympius, *idem* iii, chap. 2, pl. 18; at Messene, BLOUET, Morée, pl. 37, etc.; at Passargadæ, FLANDIN, *Perse Ancienne*, pl. 201-2; at Araxa in Lycia, where the irregular stones of a Cyclopean wall have chiselled edges "forming cushion shaped fronts used in many of the early Greek buildings", FELLOWS, *Asia Minor, etc.*, 8vo., London, 1852, p. 311; who p. 84 notices the grooving to the squared and polished white marble stones at Nicæa in Bithynia, which grooves are left rough and may have been filled up with metal, thus explaining the words "temples glittering with gold". DODWELL, *Views, etc.*, fol., London, 1834.

The "bevelled stones" of ROBINSON, *Biblical Researches*, 8vo., Lond., 1867, 3rd edit., i, 286; and iii, 15, 52, 113, 329, 371, 403, 417, 432, 461, 493, 511, are described as a "strip along the edge of the large stones cut down for a quarter or half an inch, the face of the stone being hewn: to the small stones the face is broken or rough hewn. VOGUÉ, *Temple de Jerusalem*, fol., Paris, 1864, p. 5. CONDER, *High Sanctuary at Jerusalem*, read at INST. OF BRIT. ARCHTS., *Sessional Papers*, 1878-79, p. 25-6. HEBREW ARCHITECTURE.

At Pola, rustic bossed, STUART, iv; the amphitheatres at Rome, Nimes, and Verona: at Nitello, near Hispellum, now Spello, in Italy, LECLÈRE, *Recueil*, fol., Paris, 1826, pl. 39; at Viterbo, CANINA, *Ant. Etr. Marit.*, pl. 100: in the Aqua Martia and Curia Hostilia; in the walls of Colonocelli, near Tivoli; and in a temple near Terracina.

Instances are found during the middle ages; as in the palace of Barbarossa at Gelnhausen; at Pistoja, GAILHABAUD, *Arch. du Vme.*, iii; and at Brunswick, *idem*, ii. Each square a sort of rose, at Bologna; and the palacio Fabio Nelli, at Valladolid, in WARING, *Arch. and Ornament*, 4to., London, n.d., pl. 52; 54. *Illustrations*, s. v. Façade, at Naples; and other plates. In 1521, a banqueting house at Westminster, 332 ft. long, was enclosed by canvas, and painted all the outsides most artificially with a work called rustick much like stone; HOLINSHED; and in HUNT, *Tudor Arch.*, 4to., London, 1830, p. 99. Interior plastered walls during the mediæval period were often decorated with coursed or rusticked work painted in strong red lines, and the panels ornamented with flowers, leaves, etc.; a mode of decoration carried out in the present day.

For the Pitti palace at Florence, Brunellesco adopted the so-called "rustic style" (examples may be seen in ancient edifices in Tuscany), which gives to domestic architecture the grave, fortress-like character, most proper to express the relation of the aristocracy of that time to the people, when it was indispensable that the rich and powerful should be well prepared for making an effectual defence against the violence of popular outbreaks; VASARI, *Lives*, 1850, i, 456-7. The porta maggiore at Rome is cited as a good example of rustic work. FACET, to which may be added the Granovitaya palata or facetted palace, 1484 or 1491, at Moskva. 1. 2. 3. 4. 6. 9. 14. 19. 23.

HORNER, *On the Legitimate use of Rustication in Arch.*, read at LIVERPOOL ARCH., ETC., SOCIETY, *Proceedings*, i; and CIVIL ENGINEER, *etc., Journal*, 1854, xvi, 131, with illustrations; remarks, 161: *Rustic Masonry, idem*, 1846, ix, 234: *On Rustication*, 269-70; 330-1. REYNAUD, *Traité d'Arch.*, fol., Paris, 1850, (Paris columns). *Notes on Rustication*, DUBLIN BUILDER *Journal*, 1861, p. 562. ROMBERG, *Versuch einer Arch., etc.*, 4to., Berlin, 1837, pl. 30. LETAROUILLY, *Rome Moderne*, fol., Paris, Text, 4to., 1850, p. 453, villa di papa Giulio, pl. 209-10.

RÜTGER (.....); see RUETGER

RUY CIL, in Spain 1363; see MAHOMAD. 66.

RUYSBROECK (JAN VAN); see VAN DEN BERGHE (J.).

RUZÉ (DE), was 1701 appointed controleur des bâtimens du roi at the château S. Germain en Laye; obtained 22 Dec. 1723, a salary of 6,000 livres as ingénieur et controleur for ten years of the same buildings, and at Marly, and laid out the park at the latter place. LANCE, *Dict. Biog.*

RY (CORNELIS DE), properly C. DANCKAERTS. In addition to what is there stated, he was connected with H. Keyzer at Amsterdam, 1603 in the South church and tower 237 ft. high; 1620 West church and tower 261 ft. high; and 1620 the North church; he designed the porte d'Haerlem, the finest in the city, and 1608-12 the exchange, 250 ft. by 140 ft., both destroyed before 1848. He published *Traité des cinq ordres d'Architecture reçus chez les Anciens*, with LE MUET, *Traité sur l'Art de Bâtir*, 8vo., Amst., 1646; *L'Architecture Moderne, ou Recueil d'Edifices bâtis par H. de Keyser*, fol., Amst., 1631; and *Nouveaux dessins de portes de Maisons*, 8vo. He died 1634 at Amsterdam, aged 73. COMMISSION DE BRUXELLES, *Bulletin*, 8vo., 1848, xiv, 572. 24.

RY (SIMON LOUIS DU), Du Ruy, or Dury, whose father and grandfather practised at Cassel, studied at Rome, trying to free himself from the French influence of Italian art. On his return to Cassel he 1769-79 designed the Friedericianum museum: 1770-74 the Catholic church; 1769 the opera house; and 1787 the schloss Wilhelmshöhe (formerly Weisenstein pulled down by landgraf Wilhelm IX), of which he built one wing, but not living to finish the whole it was completed by his successor H. C. Jussow. In all the above works he used the Ionic order. He became oberbaudirecktor, and died 1792. 68.

RYBAT and RIBBIT. Scotch terms for stone dressings or reveals to doors and windows. An "inband rybat" is the header, and an "outband rybat" is the stretcher. REBATE.

RYCKEL (P. DE), rebuilt 1542- , the church of S. Martin at Liège, with a lofty west tower; 1850-5 it was being restored; WEALE, *Handbook*, 8vo., 1859.

RYFAAT or RYSANT GABBLETS. The "ressant" or ogee shaped arch, a term applied in the original agreements for the finials at King's College chapel, Cambridge. 16. 19.

RYGATE STONE; see REIGATE.

RYGHOLTZ; see RIGALD TIMBER.

RYSE. Brushwood; SURTEES SOCIETY, *Fabric Rolls of York Cath.*, 8vo., Durham, 1859, p. 351.

RYSTS in the roffe of the king's great chamber in the tower of London stopped for colors laying; BAYLEY, *History of the Tower*, 4to., London, 1824-5, pt. i, App., p. xix. It is supposed to mean cracks or rifts.

RIDGE.

(ORNAMENTAL).

PLATE LXXXI.

THE following observations, and the accompanying examples, have been taken from the work by E. DE LA QUÉRIÈRE, entitled, *Essai sur les girouettes, épis, crêtes et autres décorations des anciens combles et pignons, etc.*, 8vo., Paris, 1846, and it has appeared better to separate them under distinct heads, than to leave these subjects as they were originally grouped by that author. The plan adopted, has the advantage of presenting at once the system of decoration practised formerly both upon the lead-work of the ridges of roofs, and upon the metal, tile, or stone ornaments which form the crests of such ridges. The word *crête*, as applied in France to denote the result obtained by placing curved tiles upon a ridge, is indeed expressed, particularly in the south of England, by the term tile-cresting; but as this expression is one generally used to denote an employment of plain tiles ("cresting" or "creasing"), it has been avoided throughout the following translation by the use of the word "crest", which also serves for an equivalent to the French term *dentelle*, indicating the indented character of the sky-line produced in the mediæval crests.

Our professional predecessors employed for the ornamentation of ridges a magnificence, of which an idea can hardly be formed at a time like the present, in which things are measured by the sight alone; this fact was confessed, and it was also acknowledged, that they covered even lead-work with paintings and gilding, but no existing example could be adduced to give ocular demonstration on this point. Careful observation has at last revealed the existence of gilt, and painted stripes, zigzags or chevrons on the lead-work of turrets, and on that of the bases of hip-knobs, as well as instances of leaden ridges worked in fancy designs on their bottom edges.

Examples of the first kind of decoration exist at Rouen upon the turret of the Hôtel de Bourgtheroulde; upon another, above the foreportal of the library, belonging to the Archbishop's Palace, Rue S. Romain; and in an analogous position at the Maison Caradas, Rue de la Tuile. Upon the lead several chevrons are marked one above the other, which ought to be gilt, for only the traces of them are apparent.

Chevrons are still visible at the base of the hip-knobs, which accompany the little crest of the house Rue Bourg l'Abbé, Fig. 6, Plate 81, as also below the bases of the two crosses of S. Romain's tower at the cathedral, Fig. 5. The same chevrons are to be seen at Vernon upon the leadwork of a turret, and at the bell towers of the church of Notre Dame, Châlons-sur-Marne. The chevron indeed was a sort of ornamental type, to which artists were formerly addicted.

The lead covering of the ridges of roofs also received gilt designs, as seen upon the house No. 17, Rue Herbière, in the main building at the bottom of the court, built in the first half of the seventeenth century. This very rare and curious specimen, unique in Rouen, is shewn in Fig. 2. The crests of the abbatial buildings of S. Ouen, Fig. 8, of the parish church of S. Vincent, Fig. 1, and of the Château de Meillant, Fig. 9, testify to the use of this decoration of roofs.

Below the splendid crest at the old Louvre might be seen rich garlands produced upon the lead by the application of gilding, and probably also of painting. (Jacques Androuet Ducerceau, architect, 1576.)

M. Duban, the architect charged by government with the restoration of the Château de Blois, has recognized upon the lead-work of the roof of this ancient royal residence, traces of the devices and cyphers of Louis XII and of his wife Anne de Bretagne, of porcupines, of the letter L, of fleurs-de-lis, ermine spots, etc.

The lead of the roof of the church of Nôtre Dame at Châlons-sur-Marne, exhibits clearly, even now, the traces of different ornaments, and of a S. Sebastian, which are not worked in relief (as some persons have believed), but which have been painted and gilt, for everywhere time has made the gilding disappear. A cause for the opinion that this mode of once ornamenting the ridges was the result of embossing, is, that in the places where the metal has not been protected from the action of the air by gilding or painting, it has diminished in thickness from the effect of oxidation.

For the completion of the decoration of roofs, the exterior edges of the leaden ridge, which was dressed to the slates, were cut like a fringe; this ornamental cutting, then resembled a curtain or mantling (*lambrequin*); the example, Fig. 3, is taken from the house in the Faubourg d'Eauplet, No. 63, built about the year 1680. Two other examples at Rouen still exist; one in the Rue d'Elbœuf, No. 36, upon a house built in the latter half of the seventeenth century, the other upon a pavillion appearing to date from the minority of Louis XIV, and decorated with two remarkable hip-knobs, which stands upon the property, making the angle of the Rue des Grosses-pierres, Rue du Renard, 57 and 57 bis. At the Château of Versailles, on the side of the marble court, may be seen analogous work on the leaden ridge of the buildings, which belong to the era of Louis XIII; but this usage of the lead upon roofs was known at the appearance of the Renaissance; it was recognized upon an attentive examination of the Château de Meillant.

The ruling passion of our fathers for the decoration of roofs, and even for all sorts of ornaments, arrived at the point of masking by a fine grotesque head in lead, the eastern extremity of the ridge (wooden) of the house built at the end of the sixteenth century, Rue aux Ours, No. 87, formerly Rue S. André; it is seen over the adjoining house, which is lower.

Another example, a rain-water pipe striped yellow and blue, is to be seen in the court yard of a house called Agnes Sorel's, at Orleans, built under Louis XII, and Francis I.

Royal authority once wished to put a restriction on this luxury of external decoration, which it regarded as unbridled amongst the citizens; for a sumptuary ordinance, emanating from Charles IX in 1560, prohibited to town and country people the use of gilding on wood, lead, and iron on the exterior of their residences.

This popular propensity in France for decoration, or rather for the fine arts in general, dates from the epoch of the expeditions under Charles VIII and Louis XII into Italy,—the country, where a return towards the traditions of antiquity already existed.

It is not, perhaps, out of place to quote here a passage of a contemporary historian, who bears witness at the same time to the state of prosperity, which France then enjoyed. "Large edifices are built, both public and private, full of gilding, not only the timber work and internal walls, but the roofs, coverings, towers, and statues which are without; and so are the houses furnished with everything more sumptuously, than they ever were before."—SEYSSEL, *Histoire de Louis XII*, 4to, Paris, 1615.

The use of crests, and probably also of hip-knobs, traces back to a very remote period; for two religious edifices in the Department of the Puy-de-Dôme, belonging to the style of the 11th century, are still adorned with this species of ornamentation (which is seen on shrines, and is also shown in manuscripts). These are the church of Notre-Dame-du-Port, at Clermont in Auvergne, and that of Issoire. Both have, on the ridge of their principal naves and upon their transepts, a stone crest composed of circles interlaced like the links of a chain: for their structure and details the reader is referred to Mallay-Moulins (*Essai sur les Eglises Romanes du Département du Puy-de-Dôme*, fol., 1838).

A private house at Delft has a similar ornament on its ridge, between two hip-knobs, but it is made of lead.

The epoch, called the Renaissance of the Arts, from Louis XII to Henry III inclusive, saw the triumph of this sumptuous kind of decoration, which was then employed with profusion.

The crests were composed of pieces of timber, carved and covered with lead, fixed to the ridge of the buildings, or of wrought iron-work, either bare or also covered with lead; they were even made of stone, like those of the two churches of Clermont in Auvergne, which have just been described.

In general the crests, in the mass, composition, and distribution of their ideas, are imitations of the parapets bordering the high galleries of churches and other grand edifices.

Indeed, all the civil and religious edifices of any importance in the fifteenth and sixteenth centuries, and during great part of the seventeenth, were decorated with crests and hip-knobs, and the lead-work of their roof shone with gilding and painting.

Such were the Châteaux of Amboise, Anet, Blois, Chambord, Chenonceaux, Ecouen, Fontainebleau, Gaillon, le Louvre, Madrid (near Paris). Such were also the Hôtel-de-Ville at Paris, which preserved, till nearly the middle of the seventeenth century, a very elegant crest, composed of fleurs-de-lis and crescents alternately (see the engraving by Marot); the ancient chamber of the Comptes de Paris, with a crest until the fire in 1737; and the ancient Hôtel-de-Ville at Châlons-sur-Marne, which had a very highly ornamented crest.

Several of the French cathedrals had on their ridges running friezes, composed of fleurs-de-lis and trefoils alternately. These friezes or crests at Evreux cathedral were still more rich on the ridge of the choir, whose apse is surmounted by a statue of the archangel S. Michael trampling upon Satan. The roof of the church of S. Michael at Tonnerre was also surmounted by a very fine crest (see the view engraved by Israel Sylvestre).

As regards the town of Rouen, it is known that the choir of the cathedral was ornamented, for the whole length of its lead roof, by rich open-work, which was terminated by a S. George. This colossal equestrian statue was taken down in 1794 to convert it into musket balls. The same ornamentation existed at the chapel de la Vierge in the same metropolitan church, and at the Archiepiscopal Palace; the Abbatial Palace of S. Ouen, at Rouen, demolished about the year 1816, was also formerly surmounted by a crest, shown in Fig. 8, after an engraving which François Pommeraye gives of the building in his history of this Royal Abbey; also at the chamber of the Comptes de Normandie; at the Hôtel de Bourgtheroulde, etc.

The roof of the arcade of the Grosse Horloge was decorated with a crest, accompanied by two hip-knobs, one carrying the sun, the other the moon; and in the centre of the crest, another knob carried the arms of the town.

None of these crests are now remaining, and very few towns can flatter themselves, after the destructions which have occurred, with possessing like Rouen anything of the kind.

Thus may still be seen there, an iron open-work crest, Fig. 6, crowning the ridge of a house of the fifteenth century, at the corner of the Rue Royale, and of the Rue Bourg l'Abbé, which belonged to the monastery of S. Ouen.

The high-pitched slated roof of a stone building erected at the epoch of the Renaissance, and situated in the Cour de l'Albane, near the cathedral of which it was once the charter-house, is terminated by a crowning, probably truncated, which has the peculiarity of a little open balustrade made of wood and lead. Fig. 4.

The belfry, with a high rectangular roof, of S. Romain's tower in Rouen cathedral, built in the fifteenth century, presents between its two crosses a crest or dentelle, Fig. 5, of which examples may be found at Blangy (Seine-inférieure) and elsewhere.

The Palais de Justice, built in the reign of Louis XII, is (excepting the two houses just described, and the bell tower of S. Romain) the only building in Rouen now enriched with this elegant decoration and in one portion only; still it does not exist complete; it has wanted its crowning since the year 1794, and the restoration, Fig. 7, exhibits only an attempt to re-establish the design, preserving one of the intermediate pinnacles, which as well as the two great hip-knobs of the ends of the roof were all re-worked in the reign of Louis XIII.

A drawing, by an architect in the time of Francis I of a charming crest for the church of S. Vincent, at Rouen, has been found in the archives of the department, and, reduced to one half the size of the original, is given in Fig. 1.

In the department of the Cher the Château of Meillant crowned with its crest and hip-knobs offers a very rare example of the complete decoration of an ancient roof. M. Lenormand, charged with the restoration of the Château, supplied the drawing for Fig. 9. The building owner was named Chaumont; and in allusion to his name, a sort of rebus, Montchaud, was produced in the leaden ridge by gilding and painting hills and flames.

M. Duban, architect of the S. Chapelle de Paris, has taken from a building in the town of Bruges a crest of the year 1608.

At Abbeville, a little crest of the seventeenth century composed of foliage in lead, with two hip-knobs despoiled of their ornaments, decorates a pavilion at the bottom of a garden in the Rue Chasse-rats corner of the Rue d'Angouche.

An elegant, and at the same time a simple, crest was described as still existing at Tours in 1831, upon an ancient house with a steep roof.

The above may suffice as examples of crests now remaining on houses; and as to the churches there are very few which have preserved this ornament; the following may however be mentioned: the cathedral of Rheims, the church of S. Vulfran at Abbeville, that of Conches (Eure), the cathedrals of Amiens and Noyon. The trefoils, which formerly served as a finishing to the roofs of these last cathedrals, were mutilated at the time of the revolution in 1830, being taken for fleurs-de-lis.

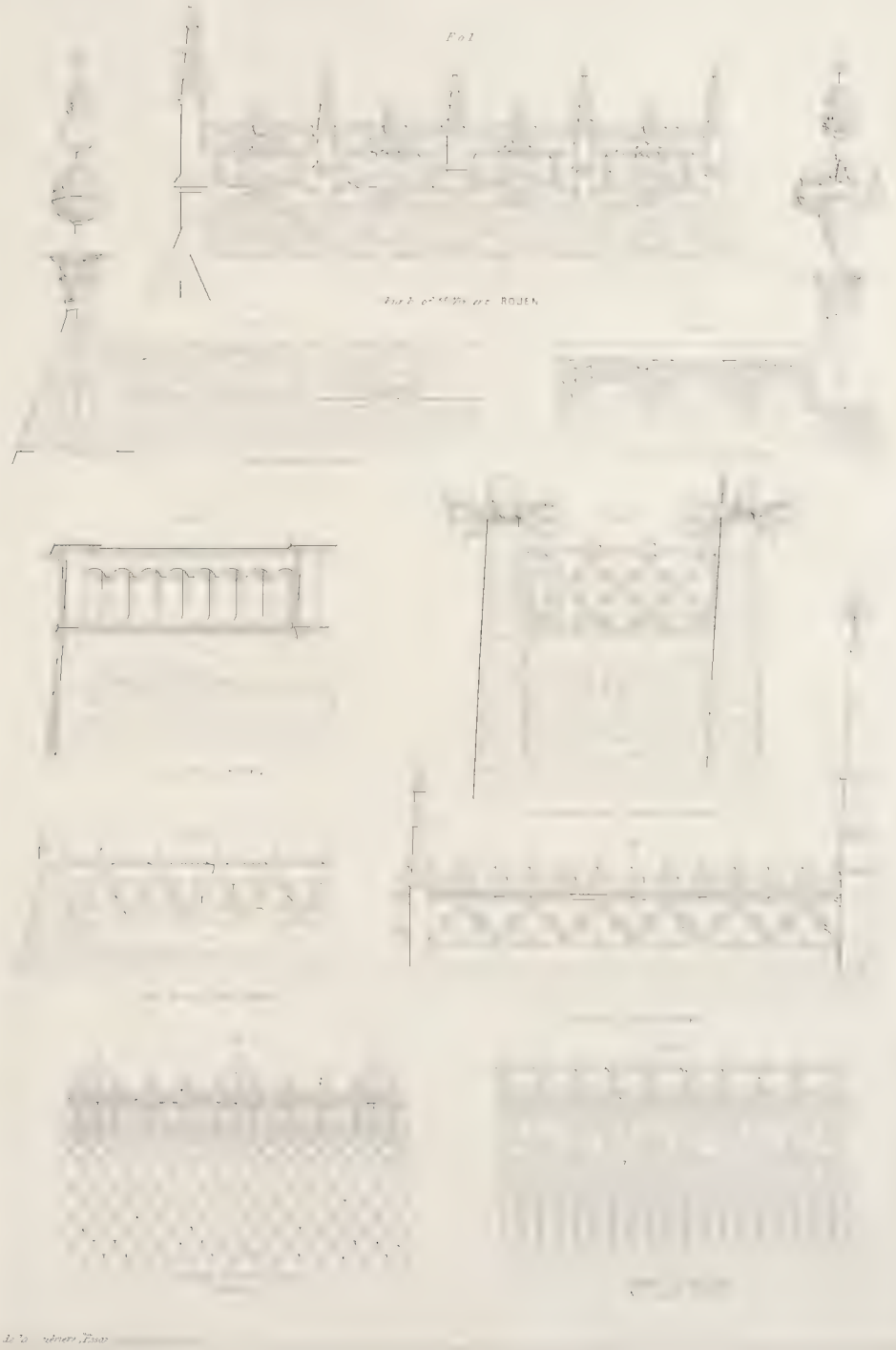
It must be observed, however, that where potteries have existed, hip-knobs and crests in terra cotta have been made, and also ornamental ridge tiles. In the neighbourhood of Etampes have been found ridge tiles surmounted with a trefoil; and at Bayeux the author saw a little crest of the greatest simplicity, composed of small pieces of terra cotta cut to different shapes. By an exception almost unique, at Valognes and especially at Cherbourg, may be found ridge tiles crowning houses of the seventeenth century with open terminations, which affect gothic forms: these tiles so ornamented have continued, so to speak, to our own time. Ridge decorations are still seen upon the coverings of the buildings occupied by the potteries under Louis XIV and his successor at Rouen. They are in general vases with blue patterns on a white ground: of which very fair specimens exist upon the houses Rue du Faubourg S. Sever No. 101; Rue S. Julien No. 44, at the bottom of a court; and on the buildings of the pottery Rue Tous-vents No. 2 managed by M. Amedée Lambert. A white dove perfectly imitated in pottery rests upon a dormer window of No. 40, in the Rue d'Elbœuf.

Rouen, notwithstanding its incessant losses, is still the French town which affords the most various, the most numerous, and the finest examples of the ornamentation of the roofs of the fifteenth, sixteenth, and seventeenth centuries.

Out of France, a magnificent crest is to be seen on the immense cathedral of Cologne.

A. W. Morant.

RIDGE.



Engraved by Norman & Co.^y 27 Strand. Mad.d Sc.^pt.

RORICZER

ON THE

CONSTRUCTION OF PINNACLES.

Roriczer, Roriser, or Rorizer, is the name of one of those families which in Germany, as well as in Italy, were devoted, during the middle ages, to the service of architecture, either from motives of religion, the rules of feudal superiors, the existence of guilds, the inheritence of accumulated precepts, or the difficulty of quitting the paternal roof.

Distinguishing individual members of the race, there remain (in the list of the architects employed upon the cathedral at Ratisbon) the Christian names of Thomas, who directed the construction of the church of S. Lawrence, at Nuremberg, and who was consulted upon the works of the cathedral of S. Stephen, at Vienna; of Konrad; and of Wolfgang, who was beheaded, with the sculptor Loy, for sedition. Popp and Buelau (*Les trois Ages de l'Arch. Goth.*, fol. Paris, 1841) also mention, at page 15, a work by Martin Roriczer, whom they term the last architect of the cathedral; but it seems almost certain that this name and title are the results of a mistake, and that the reference should have been to the *Treatise on the Ordination of Pinnacles and the Construction of Canopies*, by Mathes or Matthias Roriczer, wherein is contained all that is accessible of his history.

This production, for which he is inscribed amongst the masters of the art, is written in the dialect which was familiar to him, and of which the following quotation, from the description of his ninth figure, may serve for a specimen:—"Darnach wen du dy übrigen riss naher tust der man nit bedarf den nür zu der ausztailung" etc.

On the first page of the original is an escucheon, composed of the bearings of the family of Reichenaw, and of the diocese of Eichstedt, ornamented by the episcopal insignia, with the accompanying motto: — Wilhelmus episcopus Eustetensis ex familia Reichenaw natus hec imprimi fecit anno Dni mccccLxxxvi.

This imprint, it is observed by Boisserée (*Hist. etc. de la Cath. de Cologne*, 4to. Munich, 1843, p. 37 note), has become so rare, that at present copies of it are more generally found in old manuscripts than in type.

Notice of the great importance of the treatise was taken by F. Hoffstadt (*Gothischen A.B.C.*, preface, p. 8), who gave some quotations therefrom; and more recently it has been given to the world by C. Heideloff (*Die Bauhütte des Mittelalters in Deutschland*, Nuremberg, 1844). The whole appearance of this edition would lead to the supposition, that it was a fac-simile of the original impression; whereas, from the complaints of the latest editor, it would seem that the proof sheets had never been corrected.

The evidence on this point occupies too much space for insertion here, but is contained in the fifth page of the preface, by A. Reichensperger, to a translation of the original into modern German, by one of his friends (anonymous, but probably Linz, the publisher?). This version was the result of a laborious research made before the apppearance of Heideloff's book, and was seemingly lessened in value, on the re-publication of the original, so far as the point of scarcity was involved, but its greater practical utility was in no way depreciated.

Its especial worth arises from the circumstance of the want of supervision, above alluded to; and also (as will be proved by a glance at its predecessors) from the very important difficulties opposed by the antique and strange dialect, and by the frequent abbreviations, as well as by all the modes of expression, to those who are not accustomed to decipher such antiquities.

The title-page of this edition, consulted on the present occasion, reads thus:—"Das Büchlein von der Fialen Gerechtigkeit, von Mathias Roritzer, weyland Dombaumeister in Regensburg. Nach einem alten Drucke aus dem Jahre 1486 in die heutige Mundart uebertragen und durch Anmerkungen erlautert.—Nebst einem Anhange ueber die Construktion der Wimperge.—Mit einem Vorworte von A. Reichensperger. Mit 26 in den Text gedruckten Figuren. Trier, 1845."

It would be unjust to patron, author, and reader alike, not to preserve the following characteristic dedication, rendered with all possible fidelity, which stands on the second page of the original text.

"To the Right Reverend Prince and Lord, the Lord Wilhelm, Bishop of Eystedt, of the family of Reichenaw, my very good lord; do I, Mathes Roriczer, at present cathedral architect (**Thumbmeister**), at Regennspurg, signify my obedient humble service to the fore ready and willing:

"My very good Lord,—As your princely grace not only hitherto was, and now is, an amateur and patron of the free art of geometry, but also herctofore, even from the beginning in idea, wish, and resolution, has been a desirer that all those, who must make use, and obtain their support, of the said art, may advance in understanding thereof, so that the deficiencies and weaknesses (through which they do so assume a place to themselves in it, yet are not thoroughly well based) may become obviated, and that such an art of general utility should be thrown open and clearly exposed, so your grace at many times with me thereof has held discourse.

"To fulfil your grace's good pleasure, and to promote the common good (such indeed the materials of every art, shape, and size!), I have undertaken, with the help of God, to expound somewhat of the before-named art of geometry, and, from the very commencement of the drawn-out stonework, to explain how, and in what proportions, out of the very grounds of geometry with division by compasses, it ought to be deduced and brought into right sizes, and in the hereafter expressed manner, with a few illustrations, I have given it (and not altogether from myself is it elucidated, but, before all, especially from the old connoisseurs of the art, and particularly from 'the younkers of Prague'); begging your princely grace, and those versed in this art, to consider of this my performance, that I have undertaken it not for private glory, but altogether for general benefit, and where it is to be bettered, to better it, if any one will bring thereunto fruit, he will brighten up and give light to the art."

It being left uncertain by our author himself, as to what parts of the edifice at Ratisbon were placed under his supervision, there is little probability of this feature of his history being ascertained. Of this the difficulty has been above mentioned; nor is it certain that it will be removed by consulting the best authorities,—as Gemeiner's *Chronicle* (Ratisbon, 1818?), or Gumpelsheimer's *History* (Ratisbon, 1830). All that we know of the age of one of the finest cathedrals in Germany is, that it does not probably exhibit a higher antiquity than the early part of the fifteenth century. The famous Albertus Magnus was bishop until 1280, and in his time the third building was projected, to which a small portion on the left of the west entrance bears witness. Many dates are found in the cathedral, indicating the completion of detached portions. For example—on the eastern pillar is inscribed 1448; on the interior walling, near the chapel of S. Mary, 1464; above the principal angular entrance, 1482; and nearly parallel with this last, on the front of the northern tower of the west façade, is seen the date of 1486, at which period the edifice had attained its present form in the principal portions. From a wood-cut in G. Alt's *Chronicle* (fol. Nuremberg, 1493), it appears that the towers were not even at that time so far finished as they now appear; they are represented, like that of Cologne Cathedral formerly, with a stone being raised, by means of a crane placed upon the summit of the most southern. In the text, the chronicler describes the edifice as then not complete. It also seems that an architect was employed in the year 1514 ;and that the vaulting was finished in 1618; the works ended in 1634.—Popp and Buelau (p. 3).

It is therefore fortunate that the memory of our author's name has been ensured by the publication of his treatise, of which the before-mentioned third edition was noticed in the *Journal*, for 1847, of the Archæological Institute of Great Britain (p. 21), but the too cursory mention, therein made, of the leading operations, renders it desirable that the architect should receive, as perfect as possible, the contents of—

THE PAMPHLET ON THE ORDINATION OF PINNACLES.

Passages between brackets are interpolations of the editor, unless otherwise assigned.

"Wouldst thou a plan draw for a pinnacle, after the mason's art, by regular geometry? then heave away", and—

I. On a given right line AB, describe a parallelogram ABCD, with the sides AB, BC, CD, and DA equal. [A square is meant, which also is the net size of the plinth of the shaft.]

II. Bisect the line AB in E, and also the lines BC in F, CD in G, and DA in H, and draw the lines EF, FG, GH, and HE. [Thence results another square, which is equal to the size of the shaft when worked, but see IV.]

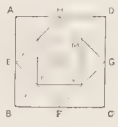


Fig. 1.

III. Bisect the line EF in K, and also the lines FG in L, GH in M, and HE in I, and draw the lines IK, KL, LM, and MI. [Thence results a third square, giving the faces of the panels of the shaft.]—See Fig. 1.

IV. Draw again a square equal to ABCD, with another therein contained, equal to IKLM, and similarly placed, and between them draw a square equal to EFGH, but turned round, "die kehr um" [*i. e.*, with its sides parallel to those of the other two squares.]—See Fig. 2.



Fig. 2.

(The three squares in these specified proportions of Roricer may be obtained in the right situations with respect to each other, and by simple geometric means, in the following manner:—In the constructed square, ABCD, inscribe a circle, in which, parallel with every side of the first square, construct a second square, which will be found equal to EFGH; in this, again, describe a circle, in which construct a third square, parallel to the sides of the before-constructed squares, and which will be found equal to IKLM.

It will be evident, at a glance, that the diagonal of the second square is equal to the side of the first; and, of course, that the diagonal of the third is equal to the side of the second; and further, of the largest circle taken as starting-point for the construction, that the side of the first square is equal to the diameter of this circle, or to double the tangent of the half right angle, or also to double the cotangent of the same angle—(for here tangent and cotangent are equal to each other)—the diagonal is equal to double the secant of the same angle in the same circle; the side of the second square is equal to double the sine (and also, because in an angle of 45°, the sine and cosine are equal, to double the cosine) of the same angle in the same circle; and further again, of course, that the side of the second square is equal to the diameter of the second circle, and so on with regard to the other relations already mentioned. One thus sees in what an intimate geometric relationship to each other the leading lines of our ground-plan stand.—Reichensperger.)

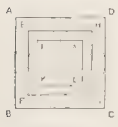


Fig. 3.

[The architect will observe that the circumscribed square is the square of the diameter, and therefore is twice the inscribed square, or four times the square of the radius; also that the diameter of the smaller circle represents the shaft of the pinnacle, and he will therefore, in practice, nearly reverse the operations of the last-mentioned construction, unless he should adopt the proportion of height.]—See Fig. 3.

V. On the diagram with the three squares, thus obtained, produce the line IK, to meet the lines EH and FG at N and N, and in the same manner produce the lines KL, LM, and MI.

VI. Divide the distance from I to N, by points, into three equal parts, and taking two of these points, with the centre N, and with the two-thirds of the line NI so divided, as a radius, cut off a distance NO, between NN on the line EH, and proceed in the same manner at each of the points N.

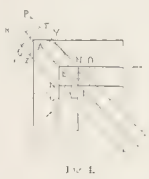


Fig. 4.

VII. Draw from each point O, a line perpendicular to the nearest side of the square IKLM, and joining it.

VIII. With the centre O, and the same radius ON, describe an arc of a circle at every point O, exactly so as to touch the points N, and the before-mentioned lines drawn perpendicularly from the points O to the square IKLM. [Thence results the hollow molding of the panel and the completed plan of the shaft.]

IX. On the diagram so far constructed, draw a line PQ [of indefinite length, parallel with a diagonal of the squares], through the point N, standing next to E in the line EH and the point N next to G in the line GH; also draw another such line RS [of indefinite length, parallel to the former line and to the same diagonal], through the points N standing next to E in the line EF and the point N next to G in the line GF: then proceed in a similar manner with lines parallel to the other diagonal of the squares, drawn through the other four points NNNN.

X. With a radius equal to the distance between the two parallel lines PQ and RS, draw a circle cutting off from the line NR a portion NU equal to twice the given radius; also, in the same manner, cut off from the line NP an equal portion NT, and draw the line TU: then proceed in a similar manner at the other corners of the great square.



Fig. 5.

XI. Divide the line TU into two equal parts at X, and with the centre T and the radius TX cut off from the line TN a portion TY equal to TX; and with the centre U and the radius UX cut off from the line UN a similar and equal portion UZ, and draw the lines XY and XZ: then proceed in a similar manner at the other corners of the great square. [Thence results the plan of the crockets.]

So is the ground plan ready.—See Figs. 4 and 5.

XII. Bisect the line AD in *y*, and the line BC in *v*, and draw a line from *y* to *v*, by which line (since, in the elevation, when mention is made of it where discourse is held of the construction of the elevation, it is so termed) mark the words "centre line of the plan."

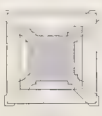


Fig. 6.

Thus is the ground plan for a pinnacle prepared: thereafter, when the letters and the construction-helpers (those only necessary to the division) are omitted from these lines, there is obtained such a diagram as the accompanying Fig. 6.

"Afterwards, wouldst thou the plan of the pinnacle updraw," [*i. e.*, from the ground plan of the pinnacle find the elevation],

XIII. Draw a right line *y v*, of indefinite length; this line, observe, is called the "centre line of the elevation" of the pinnacle; and thereon, with the width AB, equal to one side of the great square existing in the ground-plan already constructed, set off a length equal to six times the given width

A B, and mark the centre line at the division-points with the numerals 7, 1, 2, 3, 4, 5 and 6.



XIV. On the points 7 and 6 of the line *y v* draw right lines N O and P Q perpendicular to it, and produced indefinitely on both sides of it.

XV. With the centre 7, and with a radius equal to half the given line A B, cut off from the line N O equal portions 7 A and 7 B on each side of the centre 7; and with the same radius and the centre 6 cut off from the line P Q similar portions 6 C, 6 D, and draw the lines A C and B D.

XVI. With the centre A, and a radius equal to the given line A B, cut off from the line A C a portion A R; in a similar manner with the same radius and the centre B cut off from the line B D a similar portion B S, and draw the line R S, [Which will pass through the point 1 in the line *y v*, and will give the line of the bottom of the body of the shaft].

XVII. With the centre 1, and with a radius equal to half the line E F in the ground plan of the pillar, cut off from the line R S equal portions 1 E, 1 F on each side of the centre 1, and with the same radius and the centre 6 cut off from the line P Q, similar portions 6 G and 6 H, and draw the lines E G and F H [Which gives the elevation of the body of the shaft].

XVIII. With the centre R and the radius R E (equal to the distance between the lines A B and E F in the ground plan of the shaft) describe a circle cutting the line A C in T, and with the centre S and the same radius describe another circle cutting the line B D in U, and draw lines from T to U, and from E to T, and from F to U. [This gives the plinth.]

XIX. With the centre 1, and a radius equal to the distance between the lines E F and I K in the ground plan of the shaft, cut off from the line 1 *y*, a portion 1 8, and through the point 8 draw a line W X of indefinite length parallel to the line R S, then with the centre 8 and a radius equal to half the length of the line I K in the ground plan of the shaft, cut off from the line W X equal portions 8 I and 8 K on each side of the centre 8; and with the centre 6 and the same radius cut off from the line P Q equal portions 6 L and 6 M on each side of the centre 6, and draw the lines I L and K M. [This gives the margin of the panel moldings.]

XX. With the centre 8, and a radius equal to the distance between the lines E F and I K on the ground plan of the shaft, cut off from the line 8 *y* a portion 8 9, and through the point 9 draw a line of indefinite length Y Z parallel to the line W X; then with the centre 9, and a radius equal to half the width between the points O O in the line G H of the ground plan of the pillar, cut off from the line Y Z equal portions 9 *b* and 9 *d* on each side of the centre 9; and with the centre 6 and the same radius, cut off from the line M N equal portions 6 *e* and 6 *f* on each side of the centre 6, and draw the lines *b e* and *d f*. [This gives the size of the panel.]

Thereafter when the helping lines with the numerals and letters are omitted, there remains only that necessary to the pinnacle, which is called "the body of the pinnacle."—See Fig. 7.

Then wouldst thou make the pyramidal summit or spire upon the top of the body of the pinnacle;

XXI. Draw a right line *y v* of indefinite length, called the "centre line of the elevation of the spire," and thereon with the width A B of one side of the great square existing in the ground plan already constructed, set off a length equal to seven times the given width A B, and mark the line *y v* at the divisions with the numerals 8, 1, 2, 3, 4, 5, 6, 7.

XXII. On the points 8 and 7 of the line Y V, draw right lines I K and C D perpendicular to it, and produced indefinitely on both sides of it.

XXIII. With the centre 8 and a radius, equal to half the given line E F, in the ground plan of the pillar, cut off from the line I K equal portions 8 E and 8 F on each side of the centre 8, and with the centre 7 and a radius equal ("thou mayest also do well to make it moderately smaller"—) [It will be observed that in addition to the geometrical process a good judgment is necessary, but see the concluding remarks—], to the portion N O of the given line E F in the ground plan of the pillar, cut off from the line C D equal portions 7 N and 7 O on each side of the centre 7, and draw the lines E N and F O. This is hereafter called the "commencement of the spire or pyramidal summit to a pinnacle."



XXIV. Divide the line 8 2 into three equal parts 8 G, G H, and H 2; and with the centre 8 and a radius equal to half the given line A B in the ground plan of the pinnacle, cut off from the line I K equal portions 8 A and 8 B on each side of the centre 8, and draw the lines H A and H B. [Which gives the outline of the gablet.]

Through the point H draw a line L M perpendicular to the line *y v*, and produced indefinitely on each side of it; and with the centre H and a radius equal to the portion A E of the line I K, cut off from the line L M equal portions H P and H Q on each side of it, and draw the lines E Q and F P. [Which gives the thickness of the coping.]

XXV. Through the point 2 draw a line R S perpendicular to the line *y v*, and produced indefinitely on both sides of it, and with the centre 2 and a radius equal to half the length of the portion N O of the line E H in the ground plan of the pinnacle, cut off from the line R S equal portions 2 T and 2 U on each side of the centre 2: and from the point of intersection of the lines P F and H A draw a line to the point T, and from the point U draw a line to the point of intersection of the lines Q E and H B.

XXVI. With the centre 2 and a radius equal to the portion A E of the line I K, cut off from the line 2 8 a portion 2 W—and with the same radius and the centre W cut off from the line W H an equal portion W X: then through the points W and X draw right lines Y Z and *a b* perpendicular to the line *y v*, and produced indefinitely on both sides of it.

XXVII. With the centre W and the radius W X cut off from the line Y Z equal portions W *c* and W *d*, on each side of the centre W, and with the same radius and the centre X, cut off from the line *a b* equal portions X *e* and X *f* on each side of the centre X, and draw the lines *c e* and *d f*. [Which gives the finial on the gablet.]—See Fig. 8.

To draw the "flowers" to the spire of a pinnacle, proceed as follows, upon a diagram similarly constructed to the last.

XXVIII. With the centre 7 in the line *y v*, and with a radius equal to the given line A B in the ground-plan of the pinnacle, cut off a portion 7 C of the line 7 *v* [Which will be at the point 6, before obtained], and through this point C

draw a line DE perpendicular to the line $y v$, and produced indefinitely on each side of it.



Fig. 9.

XXIX. With the centre C, and a radius equal to one-third [and not two-thirds, as in original, REICHENSPERGER] of the given line AB in the ground-plan of the pinnacle, cut off from the line $C v$ a portion CH, and through the point H draw a line IK perpendicular to the line $y v$, and produced indefinitely on each side of it.

XXX. With the centre C, and a radius equal to half the length of the given line AB in the ground-plan of the pinnacle, cut off from the line DE equal portions CF and CG on each side of the centre C, and with the centre H, and the former radius CF or CG, cut off from the line IK equal portions HL and HM on each side of the centre H, and draw the lines FL and GM.

XXXI. With the centre 7, and a radius equal to the distance between the lines AB and EF in the ground plan of the pinnacle, cut off from the line $7 v$ a portion 7N, and through the point N draw a line AB perpendicular to the line $y v$, and produced indefinitely on each side of it.

XXXII. With the centre N, and a radius equal to two-thirds of the line CH, cut off from the line $N v$ a portion NO, and through the point O draw a line PQ perpendicular to the line $y v$, and produced indefinitely on each side of it.

XXXIII. With the centre N, and a radius equal to half the line IK in the ground plan of the pinnacle, cut off from the line AB equal portions NR and NS on each side of the centre N; and with the centre O and the same radius cut off from the line PQ equal portions OT and OU on each side of the centre O, and draw the lines RT and SU.



Fig. 10.

XXXIV. With the centre H, and with a radius equal to the line CO, cut off from the line $H v$ a portion HW, and through the point W draw a line XY perpendicular to the line $y v$, and produced indefinitely on each side of it.

XXXV. With the centre W, and a radius equal to the line NO, cut off from the line $W v$ a portion WZ, and through the point Z draw a line $a b$ perpendicular to the line $y v$, and produced indefinitely on each side of it.

XXXVI. With the centre W, and a radius equal to half the line EF in the ground-plan of the pinnacle, cut off from the line XY equal portions $W c$ and $W d$ on each side of the centre W, and with the centre Z, and the same radius, cut off from the line $a b$ equal portions $Z e$ and $Z f$ on each side of the centre Z, and draw the lines $c e$ and $d f$.—See Fig. 9.

"Wouldst thou draw the bosses, or crockets (ροσεη, the foliage on the angles), to the spire of the pinnacle from the plan," proceed as follows upon a diagram similarly constructed to the last, marked with the points AE8FB, in the line IK, and with the points $e f$ in the line $a b$.

XXXVII. Divide the inclined vertical line included between the parallel lines IK and $a b$, and standing on the given point E, into six equal parts, E1, 12, 23, 34, 45, and 56; and on the side I of the line E6, and perpendicular to it, draw straight lines, 1C, 2D, 3G, 4H, and 5L, and proceed similarly on the side K of the vertical line F6 standing on the point F.

XXXVIII. With the centre 8, and a radius equal to half the distance between the points XX, on any one side of the square, ABCD, in the ground-plan of the pinnacle, cut off from the line IK equal portions 8X on each side of the centre 8.

XXXIX. With the centre 6 and the radius EX cut off from the line $a b$, equal portions $6 e$ and $6 f$ on each side of the line $y v$, and draw the lines Xe and Xf.

XL. With a radius equal to the line TU in the ground-plan of the pinnacle, and with the centres E, 1, 2, 3, 4, 5 cut off from the line E6, equal portions EM, 1N, 2O, 3P, 4Q, and 5R; and with the same radius and the centres F, 1, etc., cut off from the line F6, similar equal portions FM, 1N, etc.; and through each of the points M, N, O, P, Q, and R, draw lines perpendicular to and between the parallel Xe, E6, and F6, Xf. [This gives the outline of the crockets.]—See Fig. 10.

Thereafter, if the spire be put on to the body of the pinnacle, and all letters, numerals, divisions, and construction-lines be left out, there will remain only the right lines necessary to the pinnacle; whereupon the figure will be called "a right pinnacle drawn out from the plan", as is seen in Fig. 22.

Thus has an end the "Treatise on the Ordination of Pinnacles", A.D. MCCCCLXXXVI, on the eve of Peter and Paul.

APPENDIX.

ON THE CONSTRUCTION OF A CANOPY.

(APART from the interest which it clearly in and of itself presents, the following construction, by some extraordinary accident mixed up in Heideloff's reprint with the directions for pinnacles, will be esteemed equally as a document with the above as a guide. As in the foregoing pamphlet, there appears how, through geometric construction, the plan and elevation of a pinnacle develope themselves out of the simplest elements; so, in the following notice, on the one hand, the importance of the pinnacle as a member of Architecture, and, on the other, the intimate and lively connection of this construction of a detail with the key to the general development of a Gothic building, will be put clearly before the eyes of the reader. It proves itself also, further, an art of the application of the octagon (formed through the overlaying diagonally of one square upon another), which in mediæval Architecture plays so great a part, and forms the starting point, especially in church building; for the construction of the chancel, as is well known, defines all the principal parts of the edifice.—REICHENSPERGER.)

"Wouldst thou make the templates (the molds to every part). and the flowers to a canopy, notice, that although some of the following illustrations are not drawn to the scale of the diagrams used in the treatise, yet, as will be seen on comparison, all the others in this Appendix are drawn in accordance with those before given, and of the same magnitude and scale, as all pinnacles of canopies are, of course, to be drawn in accordance with the principles already enunciated; so begin, and"

XLI. Make a square ABCD, equal to the given square ABCD, and therein inscribe a circle; through the centre Z whereof draw the diagonals and centre lines produced indefinitely.

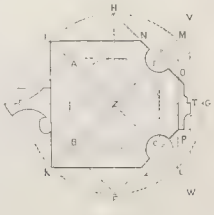


Fig. 11.

XLII. With the centre Z, and a radius equal to the given line AB, describe a circle, and therein inscribe a square EFGH, parallel to the diagonals of the square ABCD. This gives the size of the hori-

zontal measurement of the four leaves of the great flower or finial of the canopy.]

XLIII. In the same circle inscribe a square I K L M of equal size to the last mentioned square, but parallel to the sides of the square A B C D, and let the line I M intersect the line H G in N, and the line H G intersect the line M L in O, and the line M L intersect the line G F in P, and the line G F intersect the line K L in Q.

XLIV. Bisect the line D M in R, and with the centre D and the radius D R describe a circle; and with the same radius describe a similar circle about the centre C.

XLV. With the centre G, and the same radius cut off from the line G Z, a portion, G T, and through the point T, draw a line V W, of indefinite length; and from the points O and P draw lines perpendicular to the line V W and joining it.

This gives the outline of the template for the arch moldings; for K Q will be the internal face of the wall, Q P the external splay, with one hollow moulding C therein; the rectangular parallelogram under P O will contain the jamb mouldings from which the template of the mullion is found, etc.—See Fig. 11.

[The jamb and hood mouldings are inserted as found in the original; for both of which, as they are not portions of *pinnacles*, no directions are given by Roriczer. On the present occasion it may not be useless to add, that it would seem the following would have been somewhat like his rule for them.

XLVI. Let the line H E intersect the line I K in X, and the line I K intersect the line E F in Y, and with the radius X Y and with the centres X and Y, describe on the side E arcs of circles intersecting on the indefinitely-produced line Z E in *a*; and with the same radius and with the centres X and *a*, describe similar arcs on the side X of the line *a* Z intersecting in the point *b*, and with the same radius and the centre *b* draw the arc X *a*.

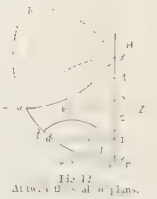


Fig. 12.
At twice the scale of plans.

XLVII. Divide the line X Y into five equal parts, X 1, 1 2, 2 3, 3 4, and 4 Y, and on the side E of the line X Y, through the point 1, draw a line perpendicular to X Y and cutting the line E Y in *e* and the arc Y *a* in *d*.

XLVIII. With the centre *a*, and a radius equal to the line *e* Y, cut off from the arc *a d* Y, a portion *a f*.

XLIX. With a radius equal to the line *d e*, and the centres *f* and Y, describe on the side *d* arcs of circles intersecting in the point *g*, and with the centre *g* and the same radius describe an arc between the points *f* and Y.

L. Lastly, perhaps, divide the line X Y into seven equal parts, and with the length of one of such parts as a radius, and the centre Y, cut off from the line *e* Y a portion *e h*, and with the centre *h* and the same radius describe a circle, whence the outline of the moulding may be traced.—See Fig. 12.

For the jamb moulding, the rule of the author may be presumed to have been as follows:—Let the line V W be intersected in the points *l* and *m*, by the lines perpendicular to it, drawn through the points O and P.

LI. Bisect the line O *l* in *n*, and the line P *m* in *p*, and draw a line produced indefinitely through the points *n* and *p*, and intersecting the line O G at the point *k*.

LII. Divide the line *m l* into eight equal parts, *m* 0, 0 5, 5 6, 6 T, T 7, 7 8, 8 9, and 9 *l*, and with a radius equal to one of those parts, and with the centre 5, describe an arc of a circle from the point 6 on to the line *n p*, and with the same radius, and with the centre 8, describe another arc from the point 7 on to the same line *n p*.

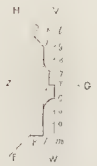


Fig. 13,
At twice the scale of plans.

LIII. With the centre T, and a radius equal to half the length of the line T 7, cut off from the line T Z a portion T *r*, and through the point *r*, draw a line on the side V of the line T Z, and perpendicular to it, joining the line 7 *k* in *s*, whence the outline O *k s r*, T 6 *p* P, may be traced; but all this is submitted with hesitation, especially as it may appear that the line T 6 should be longer by one-third, by moving the centre 5 so much the nearer to the point 0. The angle *s r* T forms the rebate for the glass.]—See Fig. 13.

"Wouldst thou find the geometric construction of a canopy, proceed in the following manner:—Upon any right line equal to the width thou wouldst give to the whole canopy:" [the architect will observe that this will be equal to the width between the centre lines of the pinnacles in the elevation, and also equal to the height of the shaft of the pinnacle, as drawn in Fig. 7.]

LIV. Divide the given right line, F G, into six equal parts, F A, A B, B C, C D, D E, and H G, and let A B be the length of one side of the largest square, A B C D, in Fig. 5. If the pinnacles

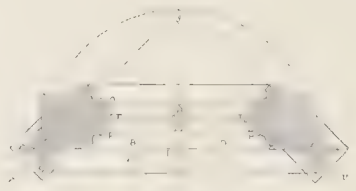


Fig. 14, at half the scale of plans.

be set obliquely to the front of the canopy, as here represented, Fig. 14, then

LV. Through the point C of bisection of the line F G, draw a line C *y*, perpendicular to the line F G, and equal to F C, and through the points F and G draw the lines *y v*, *y v*, produced indefinitely; these will be the centre lines, in which the points F and G will be the centres for the circles in the plan: if the pinnacles be set parallel with the front of the canopy, then the line F G, indefinitely produced, will be the centre line, but the points F and G will be the centres for the circle, in the plan as before.

LVI. Let the point F, and the line F A, represent the point K and the line K Q in Fig. 11, and thereon construct the diagram, Fig. 11, so far as is necessary to obtain the lines for the template K Q C F *p* 6 T *r s k* O D N I, and on the line G E repeat the operation in the contrary direction, and draw parallel lines joining the opposite points *p p*, 6 6, T T, *s s*, *k k*, and O O: [This gives the thickness of the wall and the mouldings of the opening.

LVII. (If necessary, as is here shown,) let the line *y z* represent a line in the direction of that marked with the letters O F, in Fig. 11, and on each side thereof draw the figure answering to the corresponding figure included between the parallel lines *p p* and O O. This gives the mullion.

LVIII. Let the line *y* C be produced of any indefinite length, *y z*, and with the centre C, and a radius equal to the distance between the point *a* and the point of intersection of the lines *a* Z and I K, Fig. 12, cut off from the line C *z* a portion C *w*, and through the point *w* draw a line parallel to the line F G, and indefinitely produced. This gives the place of the projection of the hood moulding, which must be stopped by corbel heads.]

LIX. (Bisect the line C *w* in *z*, and with the centre *w*, and a radius equal to the line Z E, in Fig. 11, describe a circle, and therein inscribe a square, *e f g h*, as in that figure. This gives the place for the plan of the four great leaves of the flower to the finial.—Reichensperger.)

LX. [Supposing that the sides of the square *e f g h* be bisected, and from the points of bisection that lines be drawn forming a square which will be equal to the square A B C D, Fig. 1; if in this last-produced square two others are constructed, as in Fig. 1, then the smallest will be about one-thirtieth part less in the length of one of its sides than the projection of the hood moulding C *w*, and when reduced to an octagon, will give the plan of the stem of the finial at its base.]—See Fig. 14.

LXI. (But bisect the line $e f$ in i, and also the lines $f g$ in k, $g h$ in l, and $h e$ in m, and draw the lines $i k$, $k l$, $l m$, and $m i$; thence results another square, which is equal to the size of the moulding under the flower of the finial. (If this is to be an octagon, it must be so drawn, as shown by the dotted lines.)

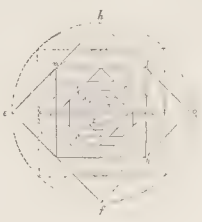


Fig 15.

LXII. Bisect the line $m i$ in n, and also the lines $i k$ in o, $k l$ in p, and $l m$ in q, and draw the lines $n o$, $o p$, $p q$, and $q n$; thence results another square, which, when reduced to an octagon, as shown by the dotted lines, is equal to the size of the plan of the pear-shaped knob of the finial.

LXIII. Bisect the line $n o$ in a, and the lines $o p$ in b, $p q$ in c, and $q n$ in d, and draw the lines $a b$ $c d$; thence results a square, which, when reduced to an octagon, as shewn by the dotted lines, is equal to the size of the plan of the stem of the finial where it stands on the octagon moulding.—Reichensperger.)

LXIV. [Bisect the line $a b$ in r, and the lines $b c$ in s, $c d$ in t, and $d e$ in v, and draw the lines $r s$, $s t$, $t r$, and $v r$; thence results another square, which, when reduced to an octagon, as shewn by the dotted lines, was doubtlessly intended to be equal to the size of the plan of the stem of the finial when it stands on the large flower; but see further on.]

LXV. (Bisect the line $r s$ in w, and the lines $s t$ in x, $t v$ in y, and $v r$ in z, and draw the lines $w x$, $x y$, $y z$, and $z w$; thence results another square, which, when reduced to an octagon, as shewn by the dotted lines, is equal to the size of the top of the stem, in which the knob finishes.—Reichensperger.) See Fig. 15.

There remains to attain the mystery of the division of the heights of the parts of the stem, for which Roriczer only gives one rule, viz., that the stem of the finial of the canopy is to be equal to one-third part of the total height of the pinnacles. [And, it would appear, that one-third portion of the length of the stem is equal to the side of the square of the plan of the flower.

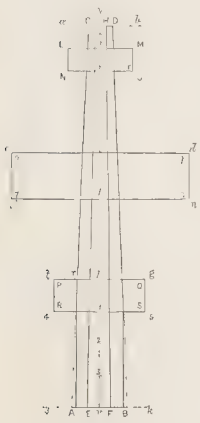


Fig 16

LXVI. Draw any right line $y v$, and thereon, with the centre y and a radius $y e$ equal to the length of the line $e h$ forming a side of the plan of the flower (Fig. 15.), divide it into three equal portions, $y e$, $e h$, and $h v$, and through the points y, e, h, and v draw lines $a b$, $c d$, $f g$, and $i k$, perpendicular to the line $y v$, and produced indefinitely on each side of it.

LXVII. With the centre h and a radius equal to half the length of the line $a b$ in Fig. 15, cut off from the line $f g$ equal portions h T and h U on each side of the centre h, and with the centre y and a radius equal to half the length of the line $w z$ in Fig. 15, cut off from the line $a b$ equal portions y C and y D on each side of the centre y and draw lines passing through the points T U, and joining the line $i k$ in the points A and B.

LXVIII. With the centre e and a radius, $e l$, equal to the length of the line $a b$ (*i.e.* to two-ninth parts of the line $e g$ both) in Fig. 17, cut off from the line $e h$, a portion, $e l$, and through the point l draw a line $m n$ perpendicular to the line $y v$, and produced indefinitely on each side of it.

LXIX. With the centre e and a radius equal to half the length of the line $e g$ in Fig. 15, cut off from the line $c d$ equal portions, $e o$ and $e p$, on each side of the centre e; and with the same radius and the centre l, cut off from the line $m n$ equal portions, $l q$ and $l r$ on each side of the centre l; and draw the lines $o q$ and $p r$: this gives the size of the elevation of the flower.

LXX. With the centre y and a radius equal to the length of the line C D (or to one side of the square $w x y z$ in fig. 15), cut off from the line $y v$ a portion, y I, and, with the centre I and the same radius, cut off from the line I v a portion, I K, and through the points I and K draw lines L I M and N K O perpendicular to the line $y v$ and indefinitely produced on each side of it.

LXXI. With the centre I and a radius equal to half the length of the line $n o$ in Fig. 15, cut off from the line L M equal portions, I s and I t, on each side of the centre I; and, with the same radius and the centre K, cut off from the line N O equal portions, K w and K x, and draw the lines $s w$ and $t x$: this gives the size of the elevation of the pear-shaped knob.

LXXII. Divide the length of the lines $h v$ into four equal parts, h 1, 1 2, 2 3, and 3 v, and through the point 1 draw a line, 4 5, perpendicular to the line $y v$, produced indefinitely on each side of it.

LXXIII. With the centre h and a radius equal to half the length of the line $i k$ in Fig. 15, cut off from the line $f g$ equal portions, h P and h Q, on each side of the centre h; and, with the centre 1 and the same radius, cut off from the line 4 5 equal portions, 1 R and 1 S, and draw the lines P R and Q S: this gives the size of the elevation of the molding under the flower, of which molding the height is one-third part of the breadth. The lowest stem of the finial, as will be seen in the elevation of the canopy, is represented as perfectly uniform in thickness throughout, and must not be greater in size of plan than the square T U, if intended to stand on the projection of the hood mold; but as this is not likely to be generally the case in practice, the diagram shews a more elegant proportion, though the continuation of lines of the angle of 5° would be even preferable. T U is equal to the squares I K L M in Fig. 1, or $a b c d$ in Fig. 15. —See Fig. 16.

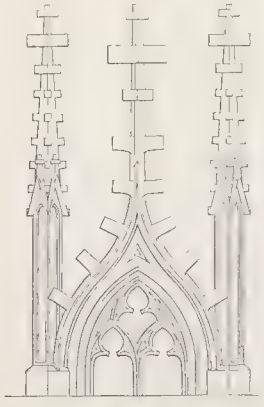


Fig. 17

LXXIV. The remaining operation, namely, to render the octagon form to the ornaments, does not require any direction; and there then results the finished diagram for the finial, as seen in Fig. 17, with which the Appendix concludes.

OBSERVATIONS.

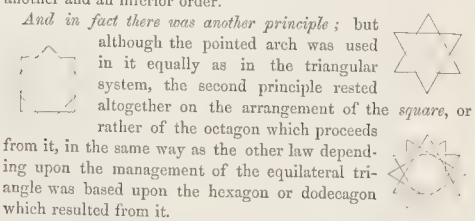
The value to be awarded to this work, and the amount of faith to be placed in its directions, may be fairly estimated by the standard of some very judicious remarks of the historian of Cologne cathedral, who says that all the forms and proportions *(shapes and sizes of Roriczer)* employed for that edifice, as well as the rules followed in the construction, are demonstrated to have resulted from the equilateral triangle and square, and their combinations with the circle, cross, and oblong rectangle.

The plans of the cathedral church of Milan (as delivered to us by Cesare Cesariano, the first translator of *Vitruvius*, in his remarks upon that author, Como, 1521, fol. 14, 15) teach that that building was designed on proportions arising from division of the equilateral triangle.

Cesariano gives no explanation of the principle, but (a very important point for us) he does term it "Germanic symmetry," and "rule of the German architects," and he adds that the edifice is of the German sort. (Fol. 13, 15, and 2, fol. 65.)

This testimony, given at the commencement of the fifteenth century, when the old church architecture was still in use and in all its vigour, this evidence of a very learned man, president over the construction of Milan cathedral, would, of itself, be proof, that this marvellous architectural style belongs especially to the Germans, and that it was the Germans who invented it, or at least brought it to the highest perfection. [A position well worthy of attention, though far from being generally allowed.]

Gaulth. H. Rivius, physician and mathematician, who published in German a translation of Cesariano (*Vitruvius Deutsch, etc.*, fol. Nuremberg, 1548, fol. 27) applies the term "principles of German stonemasons" (der Deutschen steinmetzen Grund), to what the other calls "Germanic symmetry." This denomination was doubtless then generally in use in Germany. In another passage of the same book, Rivius (fol. 27) names the order resulting from the *triangle*, "the highest and most distinguished principle of the stonemasons," and by that appears to refer to another and an inferior order.



And in fact there was another principle; but although the pointed arch was used in it equally as in the triangular system, the second principle rested altogether on the arrangement of the *square*, or rather of the octagon which proceeds from it, in the same way as the other law depending upon the management of the equilateral triangle was based upon the hexagon or dodecagon which resulted from it.

This law of the square, as it may be termed, is that on which the work of Roriczer is founded, and presents evident traces of the octagonal principle throughout.

The square, or octagon system, maintained itself amongst the German stonemasons until the commencement of this nineteenth century. At least the masons of Nuremberg were obliged, in order to obtain their freedom (*maîtrise*) to set out the plan of a church on the principle of the octagon (which in the old language was called "acht-ort" and "acht-uhr", *i. e.*, eight pointed) and this custom lasted till 1806, the period at which this imperial city lost, with its independence, its ancient constitution, and its institutions of tribes or guilds (*tribus*). Boisserée adds, "I owe all this information to a worthy man, Master Laurent Kieskalt, last city architect of Nuremberg, who gave me a copy and an explanation of his master-piece. Hereafter, in an examination of the system of ancient church architecture, I hope to be able to give a more detailed account of this chef-d'œuvre." It is in the note to this passage that he mentions the scarcity of Roriczer's treatise, classing it, as containing rules essentially the same with those followed by Kieskalt, with those in the book of instructions written in 1506 by Lorenz Locher, architect of the Count Palatine, on the art of the stone-mason, "nach des Chores maass und Gerichtigkeit," according to the measure and ordination of the choir. In the same category, he states, are also the rules mentioned by Stieglitz (*Ueber die altdeutsche Baukunst*, p. 240, etc.), as found by him in a manuscript of no greater antiquity than the middle of the seventeenth century, but which according to the formal assertion of the anonymous author, contains laws transmitted from the most ancient times. [This work refers to the design of church plans and elevations.] The difference between the older instructions and the chef-d'œuvre of Nuremberg consists, as might be expected, in that the written documents teach the principles in a more extended and more varied application.

Boisserée continues by urging that the more the student penetrates in the analysis of the proportions, the more he will be convinced that the fundamental principles of ancient church architecture are to be found, 1°, in the equilateral triangle, adopted first of all by the Pythagoreans as a symbol of Minerva or Wisdom. (F. Creuzer, *Symbolik und Mythologie 2te Ausgabe*, 11 Thl. p. 651-706, 8vo. Leipzig and Darmstadt, 1819-21. "Also the Pythagoreans have highly honoured the numbers and figures geometrical by the Gods' names; for the triangle with three equal sides they called Pallas born out of Jupiter's brain, and Tritogeneia for that it is equally divided with three right lines from three angles drawn by the plomb," Plutarch, *de Iside et Osiride*; and afterwards by our ancestors as a symbol of the Trinity; 2°. in the dodecagon resulting from the application of this triangle to the circle; a combination which the ancients, as well as their descendants (Vitruvius, lib. v. c. 6, compare lib. i. c. 1. Pliny, *Hist. Nat.* lib. ii, c. 22. Cesariano. *Vitruvio trad. et com.* fol. 10, 11, and 76. Philander. *Vitruv. comm.* 4to. Lugd. 1586, p. 21) regarded as containing all musical and astronomical proportion. (*Hist. etc. de la Cath. de Cologne*, p. 36, 37.)

[The Egyptian architects used squares in tracing the outlines of their designs. (Wilkinson, *Ancient Egyptians*, vol. iii. p. 313.)

By the Greeks the square was termed "the root of the eternally flowing nature" (Philolaus, *des Pythagoreers Lehren nebst den Bruchstucken seines Werkes*, Berlin, 1819), and was much employed in the designing of their edifices; Vitruvius (lib. v. c. 8) has described its use in forming theatres, and mentions that its sequent, the *octagon*, was employed in the formation of cities, as affording shelter from the various gales; at Athens the well-known "Tower of the Winds" was based upon it.

The Romans employed mostly the equilateral triangle. Its application to theatres is given by the same author as cited above; and to temples by Inigo Jones (in his work on Stonehenge, 1655).

The equilateral triangle was the figure whereby the ancients expressed what appertained to Heaven and divine mysteries also. "The Magi," says Pierius Valerianus (lib. xxix.) "add that a triangle of equal sides is a symbol of divinity, or sign of celestial matters."

The mediæval architects derived the equilateral triangle from Rome. The symbolism which it and its multiples had already acquired rendered it peculiarly acceptable to the clergy for the service of religion. The division of a circle by a triangle, a square, and a hexagon, seems to have been with geometricians an usual method of measuring. (Philander, *Vitr. Com.* lib. ix, c. 4.)]

It would seem that the great object of indecision of the older mediæval architects was the form most fitting and convenient to be given to the sanctuary or apsis of their basilicas; they wanted a certain rule; and geometry, united to their practised glance and the investigation of Nature, opened to them the right or good way: the equilateral triangle and the square became the key of their new constructive doctrine, and the former was their "unité." (POPP and BUELAU, *les Trois Ages de l'Architecture Gothique*, Paris, l. f. 1841, p. 9.)

With regard to the proportions of the spire to the pinnacle in Roriczer's work, it is interesting to remember what Boisserée has observed, upon what he calls the "pyramidal system of Cologne Cathedral", based upon the equilateral triangle. The pointed arch constructed upon this triangle makes the most obtuse vertical angle in all the edifice; viz., of sixty degrees. Then comes the gable of the great roof between the two towers, with an angle of 51° 30; then the gable below it, which crowns the large window, with an angle of 47°; and lastly, the gable of the great roofs of the choir, and consequently of the transepts, with an angle of 49°.

All the gables of the upper windows of the choir have an angle of 45°, and those of the windows of the tower an angle of 40°. The remaining gablets of the buttresses, counterforts, and turreted pinnacles, have angles of 38°, 36°, 35°, 32°, and 30°, so that all, with slight deviations, are in the same relation as the central angles of the hexagon [60°], of the heptagon [51°, 25⅞], of the octagon [45°], of the nonagon [40°], of the decagon [36°], of the hendecagon [32°, 43 7/11], and of the dodecagon [30°]. The spires of the principal towers form an angle of 15°, and those of many pinnacles on the buttresses and counterforts are the same. The spires of the little pinnacles are, for the greater part, of 10°, and those of the smallest of 5°, so that all these spires have between them the same relation which exists between, and are the same as, the central angle of polygons of twenty-four, thirty-six, or seventy-two sides.—*Hist.* etc., p. 72.

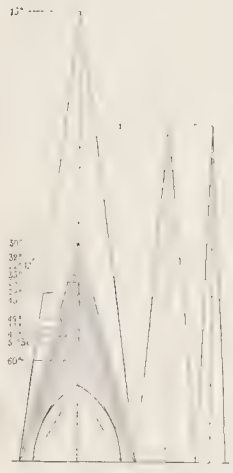


Fig. 21.

[The philosophical principle of the design of this shaft and spire in one pinnacle seems to be conveyed in the argument, that it can be drawn in the central angle of a seventy-two-sided figure—*i. e.*, in an angle of 5°,—which appears to be the case; for, having the plan of the pinnacle drawn as in Fig. 6, and circumscribed by a circle inscribed within a square, let one side of this square be the base of an isosceles triangle whose angle, included between the equal sides in 5°, and bisect that angle by a line produced indefinitely, which will be the centre line of the pinnacle required, and on which fourteen consecutive divisions, each equal to the given line A B in Fig. 1—*i. e.*, to the width of the shaft of the pinnacle—are to be marked off, giving points through which lines perpendicular to the centre line are to be drawn indefinitely produced, when, on following Roriczer's directions, it will be found that the first line marks the ground-line adopted by the master; the second, the top of the plinth; the seventh, the division between the shaft and the spire; the eighth, the gablet of the shaft; the ninth, the top of the finial thereon; the thirteenth, the top of the great flower of the finial; the fourteenth, the point at which the distance between the limbs of the angle of 5° will be, as recommended by Roriczer, moderately less than — *i. e.*, three quarters of — the length of the line N O in Fig. 8, which, if not reduced, would be included at about halfway between the thirteenth and fourteenth division; but this is altered, as its adoption would prevent almost all the geometrical incidents of adaptation, both in the spire of the pinnacle and in the finial of the canopy, and would spoil the relationship of the proportions which were found to exist (and very remarkably that of one ninth part of the total height) on making the distance between the centres of the pinnacles precisely equal to half the total height from the springing of the arch.

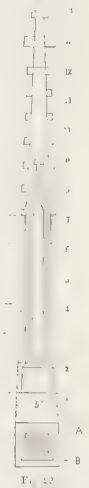


Fig. 22.

Beyond this and the adoption of the general law of design, "the smaller the real size of the base, the taller the actual height of the work," the authors of the preceding directions do not appear to have paid particular attention to effect in execution; nor was it necessary, since a difference of one degree and a half, almost inappreciable by the general eye, is the maximum variation of the angle of the spire in perspective.

The height of the triangle above the seventh division will be found, in practice, about eleven times and a half its base on that line.

Even if Roriczer had intended to prescribe a form, and fix the proportions for *all* pinnacles, the value of his work would still consist in showing how he was guided in detailing *one* specimen; by laws generally taught and obeyed in his time, but which, being only the results of practical geometry, are not often, if ever, studied at this period, when that art "of universal use" is so much neglected by the student, for whom, by the preservation of Roriczer's *Treatise*, some of the rules are recovered.

But must they be taken as an invariable formula? or do such laws become susceptible of application in different manners, when an idea has been fixed, the key resolved upon, and the work furthered to the point of consideration of the details? Especially do the proportions of the shaft and the spire to each other, and in themselves, vary according to the spirit (*i. e.*, genius or taste) of the designer; a position supported by the old proverb of the masons—

> "Zirkel's Kunst und Geheimnisheit
> *Ohn Gott* niemand nutzt,"

which may be translated—

> "That the Compasses' Theory and Practice
> *Without God*, profit nobody, a fact is."

JOHN W. PAPWORTH.



